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THE UNIVERSITY OF ALBERTA

A STUDY OF THE RELATIONSHIP BETWEEN HOLLAND'S THEORIES OF VOCATIONAL CHOICE AND THE PREDICTION OF SUCCESS FOR JOB SEEKERS

BY

KRIS MAGNUSSON

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

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ABSTRACT

Theories of vocational development have been used to predict achievement, job success and job stability. In particular, Holland's model of personality types has been subjected to extensive scrutiny. However, one aspect of career development that has received comparatively little attention is the process of obtaining employment once career decisions have been made. The purpose of this study was to assess the nature and strength of the potential relationships between Holland's typology (and support constructs) and success in finding employment.

A sample of 352 students from three technology programs were given the Self-Directed Search and My Vocational Situation approximately two months prior to their graduation date. A follow-up survey was conducted to determine their employment status six months after graduation.

The predictor variables included the Holland theme scores, and the support constructs of congruence, consistency, differentiation and identity. Four separate criteria were used for measuring success in the job search: employment status after 6 months; relationship of employment to training; length of time required to find employment; and starting salary.

The results of the study demonstrated a need for

conducting environmental assessments when using the Holland model. Each of the program environment codes assessed in the study were different from those predicted.

Several statistically significant relationships were found between the predictor and criteria variables; however, no patterns of relationships emerged, and it was concluded that the Holland variables were differentially predictive; that is, they were dependent on the specific environment. Finally, the specific predictions made by Holland pertaining to job change and/or unemployment were not supported in this study.

The author concluded that the use of structural approaches in general, and the Holland system in particular, is of little relevance in the prediction of success in the job search process. Additional work needs to be done in the operationalization of Holland's support constructs, and further clarification regarding the inter-relationships between the support constructs and the basic personality themes is needed. Recommendations for further research utilizing both the Holland model and other, process-based approaches, are made.

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CHAPTER I

INTRODUCTION

Work has long occupied a central role in human existence. Although the role remains central, the nature of the role is constantly evolving. Hunters and gatherers, farmers, and skilled trades and craftsmen represent different epochs in the evolution of the kinds of work typically performed by a majority of the population.

At one time, the term "career" was used to refer to what one did as a means of maintaining one's self and family. The typical pattern included a virtual life-long committment to, and involvement in, a specific kind of work. Individuals were defined by, and even named after, their particular occupation; surnames such as Carpenter and Smith attest to the significance one's occupation played in determining one's identity. The work one performed provided more than just a means of income; it also determined who one associated with, the status one achieved, and the general life style one led.

The one-life one-career concept has been eroding since the turn of the twentieth century. Social changes, as well as the changes brought on by technological advances, have led to a reformulation of how we conceive of "careers" (Isaacson, 1979). People are now expected to experience

several occupations within the space of their working life, and the term "career" has come to represent all of the factors that contribute to, or have an effect on, one's occupational pattern throughout life.

The need for effective career planning as a means of determining a suitable career path was apparent to people such as Parsons as early as the late 1890's (Weinrach, 1979). At that time, the emphasis was on identifying an occupation that would best suit the individual's unique set of talents, interests and opportunities. Presently, the changing nature of work, and the concomitant increased demands on the individual to be prepared for occupational change within one's career-span, have heightened the need for career planning and simultaneously stimulated renewed theoretical interest in the nature of career development.

A typical model of the stages of career development was presented by Campbell and Heffernan (1983), who viewed the developing career in four stages. First, the individual prepares for an occupation and obtains employment. Second, the individual is required to demonstrate competence and adjust to the demands of the occupational environment. In the third stage, the individual is concerned with advancing in, or maintaining one's place in, the occupation. The final stage represents a declining involvement in the work place.

Campbell and Heffernan (1983) also identified the developmental tasks associated with each of the four stages. The tasks of the preparation stage include assessing personal attributes, making vocational decisions, developing plans for entry to work, adjusting to the demands placed on the individual during preparation, and finally, obtaining a position in the occupation of choice.

Theories of career development and career decision making have characteristically focused on the interactive variables critical to the process of making a career decision, and the subsequent satisfaction with, or success in, the chosen field. Emphasis is placed on identifying individual presage dynamics, such as patterns of personality or interest, which are most relevant to the process of decision and to the consequences of the choice. In the Campbell and Heffernan (1983) model, theories typically focus on the assessment, decision-making, planning and preparation tasks of the preparation stage; the tasks associated with obtaining a position in the chosen field are largely ignored.

Inherent in most theories of career choice and development is the tacit assumption that once a choice has been made, opportunities to exercise that choice will be available. However, given a less buoyant economic climate, there will be a concomitant decrease in the availability of jobs, and therefore less opportunity to exercise one's

career decision. For the job seeker, this means increased competition for fewer jobs; for the employer, it generally means greater selectivity in hiring.

Models of career decision making provide an adequate framework for describing the process and outcomes of career choice; they do not, however, address the likelihood of success in the process of job-seeking. Thus, there is a need to determine the extent to which the interactive variables that predict success in occupational choice also have an impact on the prediction of success in obtaining employment.

Background to the Problem

Weinrach (1979) classified theoretical approaches to career decision-making into two major categories: structural, and process approaches. A structural approach is one in which characteristics of the individual are compared to characteristics of the work environment. Specific links are made between the world of work and the individual; thus, a structure for career decisions is provided.

A process approach to understanding careers focuses on the individual dynamics inherent in the variety of decisions and life roles that an individual encounters in his or her career. The focus is expanded to include the interaction of a variety of factors pertinent to one's working life. The

work of Donald Super (1957; 1985) exemplifies the process approach.

The structural approach has an historical advantage over process approaches; the trait-and-factor approach of Parsons, which was first formulated in the late nineteenth century, is still popular today (Weinrach, 1979). The first step in traditional structural approaches is to use a variety of psychometric instruments in order to better describe the characteristics of the individual. This information is then compared to information about the work environment, and a decision-making strategy implemented that provides for the best match between the individual and the environment. Thus, structuralists rely on the information provided by testing, and on the availability of accurate data relating to the world of work.

The most popular of the modern structuralists is John Holland. Holland (1985) has proposed a model of six personality themes, which correspond to six working environments. These personality themes are supported by four constructs which help to further define the individual's occupational personality pattern. According to Holland's theory, individuals will experience the greatest degree of career success when they are able to express their personality in their work; that is, when there is a match between one's personality and the demands and constraints of the work environment. Furthermore, Holland suggests that it

is possible to use his typology and support constructs to predict aspects of career "success".

Many of the predictions based on Holland's theory have been subjected to extensive analysis. The basic six theme personality typology is widely used in sources of occupational information, and the relationships between the support constructs and areas such as job satisfaction and achievement have been extensively researched. Despite the extensive research base and widespread application in practice, no attempts have been made to explore the structural links between Holland's typology and support constructs and success in the job search process.

Purpose of the Study

An effective theory of careers must, by definition, reasonably account for the many different dimensions of one's career. The purpose of this study was to examine the relationship between the theoretical constructs of career decision making proposed by John Holland and individuals' success in obtaining employment. The focus was on individual personality and interest dynamics and their relative effect on success in the job search.

An important caveat to the purpose of the research is that the principle focus of the study was not to determine the critical components of job search success, but rather to assess the efficacy of the Holland typology and support

constructs in the prediction of that success. In other words, the principal inquiry was to further explore Holland's theory and its relevance to job search success. The research represented an attempt to round out Holland's theory, and use it to account for the missing dimension of career development theory - namely, the process of obtaining employment in one's chosen occupation.

Research Problems

The primary research question addressed in this study was, "Are there any relationships between Holland's typology and theoretical support constructs, and success in finding employment in one's chosen occupation?"

Three phases of analysis, each with its own specific research questions, were conducted in answer to the primary research question. First, an environmental assessment of the participants in the study was conducted. The second phase included a general search for relationships between aspects of Holland's theory and determinants of success in the job search process. Finally, in the third phase, the accuracy of Holland's specific predictions with respect to the job search process were assessed.

The specific research questions, for each phase of the study, were as follows:

Part I: Environmental Assessment

1. What is the Holland environmental code for each of the subgroups in the study?

2. How do the environmental codes obtained for each program compare to those predicted in the Occupations Finder (Holland, 1986)?

Part II: General Search for Relationships

3. Are there any significant relationships between Holland's typology and basic constructs and the determinants of success in the job search process?

4. Does any combination of the Holland predictor variables significantly improve the prediction of job search success?

5. Is it possible to use the Holland predictor variables to classify individuals into categories of success in the job search process?

Part III: Analysis of Holland's Specific Predictions

6. For individuals in an incongruent environment, are those who are more highly differentiated and of greater consistency more successful in coping with unemployment and/or job change?

7. Is effective coping with unemployment positively associated with high consistency and identity scores?

8. Does effective coping with unemployment and/or job change follow the predicted Holland sequence of S-E-A-I-R-C?

One additional specific research question not posed by Holland was also asked:

9. For individuals who found employment directly related to their training, did their primary theme code have any effect on the length of time it took to find the employment?

Significance of the Study

The research conducted in this study assessed the ability of Holland's basic constructs to predict success in the job search process. The results helped to expand our existing knowledge of the determinants of vocational development by focusing on the job search dimension, and linking success in this area to personality variables. This information both lends support to new applications of Holland's theory, and identifies some of the limitations of his basic constructs.

The research may have practical applications for career counsellors and job seekers. If individuals who are likely to experience difficulty in finding jobs can be identified, corrective strategies may be employed to increase their chances of success in locating employment.

The initial assessment of the program theme codes also served to further define the nature of the programs used in the study, and thereby could provide useful information for the counselling of prospective students. The environmental assessment technique that was used may also provide a more reliable system for those wishing to conduct such assessments in the future.

Definition of Terms

To the reader who is not familiar with Holland's (1985) theory, many of the terms used in this study may seem confusing. For clarification of the Holland typology and support constructs, the reader is referred to the description of Holland's model presented in the review of the literature in Chapter II; the specific terms of his model are explained in greater detail in that section. What follows is a more generalized listing of the terms used in this research.

Job Search Success. "Success" in the job search process is a somewhat nebulous concept, open to interpretation and variation in meaning. For the purpose of this study, four separate criteria were used to assess each individual's success in the job search process. First, each student's employment status was determined; students were classified as being employed full time, employed part time, or unemployed. However, simple possession of a job does not

necessarily reflect "success" in the job search; therefore, the relationship of the employment to the student's training was determined. Those students who found employment were asked to indicate whether the work was directly related, indirectly related, or unrelated to their training. Two additional criteria were also used to assess success: the length of time it took before obtaining employment, and the starting monthly salary. Thus, success in the job search was determined using four separate measures; in subsequent analysis, each measure was treated as an independent measure of job search success.

The four categories of job search success were defined as follows:

1. Employment status: employed full-time, employed part time, or unemployed at the time of the follow-up investigation.

2. Relationship of employment to training: for those employed, the nature of employment was categorized as being directly related to their training, indirectly related to their training, or unrelated to their training.

3. Number of days of employment: for those who found work, the number days that they were employed during the course of the study was determined.

4. Salary: for those employed, the starting monthly salary was recorded.

Holland Predictor Variables. The independent variables in the study. These included the six Holland theme scores, the three position personality code, and the support constructs of differentiation, consistency, congruence, and identity.

Additional Predictor Variables. Further to the Holland predictors, subject age, and amount of full or part time employment were included in the predictor set.

Criteria Variables. The dependent variables in the study. They included the four measures of job search success defined above.

Subgroups. The analysis of the research questions was conducted on three separate samples of potential job-seekers. Each sub-group consisted of the students of one of the following technical training programs: Electronics Engineering, Accounting Technology, and Architecture Technology.

Whole Sample. The inclusion of all three of the subgroups defined above into one large group.

Organization of the Dissertation

This dissertation is organized as follows:

Chapter II - presents the review of the pertinent literature, including a detailed description of the Holland model, and a summary of the Holland terms used in this research.

Chapter III - presents the sample, the instruments, the data collection procedures, the coding or measuring of all predictor and criteria variables, and the data analysis procedures used for each phase of the research.

Chapter IV - presents the results of the environmental assessment, which was the first phase of the research.

Chapter V - presents the results of the search for relationships between Holland's theoretical constructs and success in the job search process (the second phase of the research).

Chapter VI - presents the results of the third phase of the research, which examined the specific predictions Holland made about the connections between his theory and success in the job search.

Chapters VII, VIII and IX - include, respectively, the discussion of the results of each of the three phases of the research.

Chapter X - provides a summary and recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

A review of the relevant literature has been conducted in the following:

1. Theoretical Frameworks of Career Decision Making
    a) Classifications of Models
    b) Super's Developmental Model
    c) Holland's Typology
    d) Measuring Holland's Constructs
2. Holland's Constructs Reviewed
    a) Congruence
    b) Consistency
    c) Combinations of Constructs
    d) Identity
    e) Advanced Scaling Procedures
    f) Job Search and Holland's Constrtucts

The review is followed by a statement of the research questions.

1. THEORETICAL FRAMEWORKS OF CAREER DECISION MAKING

a) Classifications of Models

There are a variety of theories and models of career choice. Within these models, terminology varies; terms such as career choice, career decision making, and vocational choice are often used interchangeably. The conceptual

approach and fundamental assumptions of the theorists also vary; therefore, research into the applications of career decision making theory must first identify the theoretical assumptions upon which it is based.

Isaacson (1979) has classified the diversity of career development theories into two major categories: a need-deficit approach, which emphasizes the role of a career in meeting psychological needs, and a self-concept or developmental approach, which focuses on the desire of individuals to maintain or enhance their self-concepts through their careers. Weinrach (1979) also groups the theorists into two categories, roughly paralelling Isaacson's, which he has labelled "structural" and "process" theories. The former group includes theorists such as Hoppock (1976), Holland (1985) and Roe (1956), while the latter would include people such as Ginzberg (1972), Super (1957; 1985) and Tiedeman and O'Hara (1963).

According to Weinrach's (1979) classification, structural theories are those that attempt to make a direct link between individuals and the world of work. In order to do so, characteristics of both are identified in detail, and the interactions between them analyzed. Typically, career counsellors from a structural perspective will systematically explore the characteristics of both the individual and the marketplace. Although it has the advantage of providing a relatively simple method of

coordinating client characteristics with specific job titles, critics argue that such an approach merely describes vocational behavior without explaining it (Weinrach, 1979).

The structural approach in general, and trait-and-factor theory in particular, dominated career counselling theory for the first half of this century. Ginzberg (1972) provided an alternative explanation: vocational development as a process, rather than an event. In general, process theorists seek to explain occupational choice, rather than merely describe it. As such, they are less concerned with forging links between the individual and the world of work, and focus instead on developmental patterns or stages.

An attempt, such as presented in the present study, to identify vocational personality correlates with success in the job-search process obviously fits within the structural domain. However, the developmentalist position is capable of setting a context for the descriptions of the structuralist; therefore, a brief summary of Super's developmental theory is presented.

b) Super's Developmental Model

One of the leading developmental theorists is Donald Super, who combined developmental psychology with self-concept theory. He developed 12 propositions to account for vocational development. Foremost among them

were the concepts that vocational development is a continuous, predictable and dynamic process, affected by self-concept. The field one eventually settles into is affected by individual interests, values, needs, education and social status. These factors are modified by opportunity and external factors such as economic climate (Isaacson, 1979).

Super (1957) suggests that individuals may experience difficulties as they attempt to implement their self-concept, especially during the later exploration stage. These difficulties may include problems with both job selection and placement. The task of implementation is further affected by vocational interests; Super (1957) noted "there is a strong tendency to enter and remain in fields of work which provide outlets for their interests, and to leave inappropriate fields for more appropriate ones" (p. 224).

Super's developmental theory provides a context for understanding the relationshp between career patterns and individual personality characteristics. He further makes a tenuous link between self-concept (personality) variables and potential difficulties in job selection and placement. Super's assumption that such a link exists is consistent within his theoretical formulations; however, the instruments that have been developed as a result of his work have tended to focus on the identification of an individual's career stage, the life-role that the individual

is valuing the most, or the salience between one's life role and work situation. While all have merit in general developmental theory, they do little to assess the individual's occupational personality and are therefore of limited value in an exploration of the relationships between personality and job placement.

c) Holland's Typology

John Holland (1985) has developed a framework for vocational development based on occupational personality types. He proposes that there are six primary (attitudinally-based) personality types, or themes: Realistic, Investigative, Artistic, Social, Enterprising and Conventional (commonly referred to as "RIASEC"). Each type represents a distinct pattern of personality characteristics.

Realistic individuals typically possess mechanical or athletic ability. They have a preference for "hands-on" activities, and like to see the results of their work in a tangible fashion. A Realistic person is typically found working with machines, tools, plants or animals. The emphasis on working with "things" may result in a lack of social skills. Examples of Realistic occupations include skilled trades (such as carpentry, motor mechanics, plumbing, etc.) and farming.

The Investigative theme represents analytical, curious and precise individuals. The Investigative person prefers problem-solving activities and is usually academically inclined. Although they are skilled at problem-solving, they usually have poor leadership skills. Examples of Investigative occupations include scientists, doctors and mathematicians.

Individuals who are Artistic are expressive, imaginative, creative and non-conforming. They prefer unstructured environments, and tend to lack detail or clerical skills. Artistic people are found in the fine and performing arts, the fashion and design industry, in decorating, and in photography.

The Social type is represented by people whose main interest is in working with other people, for the good of the people that they are working with. They tend to prefer helping, guiding or teaching roles. The Social personality typically lacks mechanical skills, and can be found in occupations such as teaching, social work and counselling.

Enterprising individuals also work with other people, but usually to benefit either themselves or the company that they work for. They are usually good organizers, manipulators and leaders. The focus of their interests is on persuading or convincing others, but they often lack analytical skills. Examples of Enterprising occupations include lawyer, salesperson, and politician.

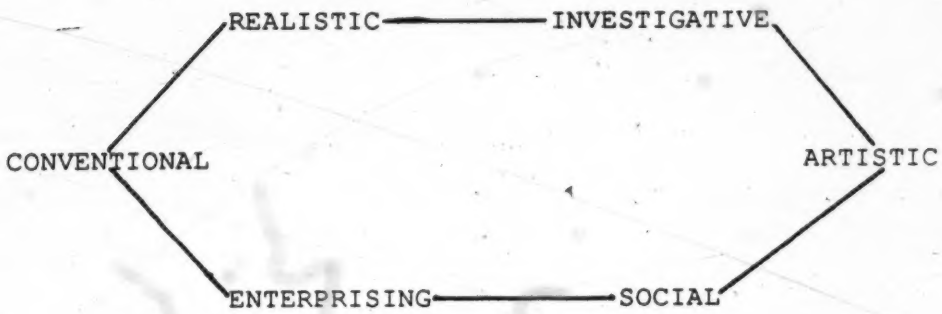
The final theme, Conventional, represents people who have a fairly conservative outlook. They prefer well-structured activities and environments that do not change much. A Conventional person prefers to follow instructions rather than to give them, and usually lacks artistic ability. Examples of Conventional occupations include accountant, bank teller, and secretary.

Holland also suggestd that there are six model environments that correspond to the six personality types. People generally seek environments compatible with their personality, and tend to develop skills and interests consistent with their type.

Individuals are seldom a "pure" type; usually, they have a primary theme, and secondary interests. Thus, an individual may be described by the relative strength of each theme, and by the pattern of the themes; the six primary themes provide for 720 such patterns. However, rather than describe an individual in terms of the full six-theme pattern, Holland utilizes only the three most important, or dominant, themes; this three-theme representation is known as an occupational code, or in the case of an individual, an occupational or vocational type. For example, an individual may be classified R-I-C, which would indicate a Realistic individual with secondary Investigative and Conventional characteristics.

FIGURE I:

HOLLAND'S RIASEC MODEL



The six personality types described by Holland are augmented by four additional theoretical constructs: congruence, consistency, differentiation, and identity. These constructs serve to provide additional information about the individual based on the inter-relationships among the six themes.

Congruence refers to the degree of compatibility between an individual's vocational type and his or her work environment. Holland postulates that the level of congruence will affect the degree of vocational satisfaction, stability and achievement.

Consistency refers to the degree of similarity among the themes of an individual's occupational code. Each theme may be visualized as occupying one corner of a hexagon, in the following order: R-I-A-S-E-C (see Figure 1). Adjacent themes are seen as being compatible, or consistent

(i.e. R-I; R-C), while opposites are incompatible, or inconsistent (i.e. R-S; I-E). Holland suggests that the greater the consistency, the more predictable will be the individual's vocational behavior.

The third supportive construct is called differentiation. Individuals are thought to be differentiated if they can be clearly defined by one particular type. A measure of the degree of differentiation is obtained by determining the difference in scores between the most prevalent type and the least prevalent type of an individual's profile.

The final construct is that of identity; it refers to the degree to which an individual possesses a relatively clear and stable picture of one's vocational self. Holland (1985) noted that there is a considerable theoretical and practical overlap between identity and the constructs of differentiation and consistency; they may, in fact, be attempts to measure the same thing.

Holland's theory provides a useful mechanism for studying an individual's career pattern. He noted that "...by applying the theory with its classes and subclasses and relatively simple sets of definitions to an entire life span, we can use a great range of information about human behavior and environments, and thus more easily study person-environment interactions and their outcomes" (Holland, 1985. p. 52). He further postulated that

"development over the entire life course can be understood as a long series of person-environment interactions..." (p. 52). Thus, the utility of Holland's theory lies in its ability to both describe an individual's vocational personality at a given time, and to provide a framework for understanding the developmental nature of the person's vocational/life course. In particular, instruments developed from his theory (the Vocational Preference Inventory, and the Self-Directed Search) provide direct measures of occupational personality, and as such can be used to determine whether or not there is a link between personality and success in the job search.

d) Measuring Holland's Constructs

Holland provided the theoretical formulations for each of the constructs described above, but, with the exception of the Identity scale, was much less precise in describing exactly how they were to be measured. The six themes are represented by actual scores on an assessment instrument such as The Self-Directed Search, and Identity is represented by the score obtained on one subscale of My Vocational Situation. However, the remaining three supportive constructs of congruence, differentiation and consistency are derived scores; that is, they are represented by various combinations and/or comparisons of the theme scores.

Congruence is typically measured with the Zener-Schnuelle Index of Agreement (Holland, 1979), which

FIGURE II

Zener-Schnuelle Index Of Agreement

Method for determining degree of agreement	Index of Agreement
Are codes exactly alike?	6
Are the first two letters in the same order?	5
Are the letters the same, but out of order?	4
Does the first letter in each code match?	3
Do the first two letters of one code match any two letters in the other code?	2
Does the first letter of either code match any letter in the other code?	1
Is the first letter from one code not found in the second code?	0

(Adapted from The Self-Directed Search Manual, by John Holland, 1979. Consulting Psychologists Press, Inc., Palo Alto, California.)

compares tested three-letter codes with environmental codes. The index is a six-point scale based on descriptions of the similarity of the codes (see Figure II). Thus, for example,

an individual with a tested code of R-I-A and working in an environment which was coded R-I-A would be assigned a congruence score of "6", because the codes are identical. The same person working in an I-A-R environment would receive a congruence rating of "4", because the letters in the code are the same, but in a different order; if the environment were coded S-E-C, the congruence rating would be "0" (none of the letters in the code match). The Zener-Schnuelle Index is the most widely used method of assessing congruence.

The differentiation construct, as defined by Holland (1979), and used in most of the early research (O'Neil, 1977; Peiser and Meir, 1978; Wiggins, Lederer, Salkowe and Rys, 1983), is represented by a simple subtraction of the lowest theme score from the highest theme score. Thus, for example, a RIASEC profile of 24, 14, 7, 18, 15, 21 would yield a differentiation score of 17 (24 - 7).

Consistency is generally represented on a two or three-point scale, based on the relative position of the two highest themes on the hexagonal model (Figure 1). Using the three-point scale, adjacent themes would be scored as "3" (i.e., R-I), themes once removed would be given a value of "2" (i.e., R-A), and opposite themes would be coded as "1" (i.e., R-S). The two-point scale uses similar criteria, but assigns the value of "2" for adjacent themes, "1" for themes once removed, and "0" for opposite themes.

2.HOLLAND'S CONSTRUCTS REVIEWED

The literature pertaining to Holland's typologies and constructs is vast; Holland (1985) identified over 400 empirical studies conducted on the topic between 1959 and 1983. An illustrative sampling of the research will be presented here.

a) Congruence.

Bruce Walsh (1979) reviewed research, conducted in 1978, that pertained to the construct of congruence and concluded that the congruence hypothesis was valid. A similar review of 1977 research developments by Zytowski (1978) concluded that "the basic congruency idea of the theory seems well established" (p.142). To illustrate, Mount and Muchinsky (1978) conducted a study of the relationship of job satisfaction to congruency levels for 362 subjects; they concluded that congruent individuals were more satisfied with their jobs than were non-congruent individuals. An earlier study by Morrow (1971) found satisfaction with choice of college major to be significantly related to level of congruence for mathematics students.

A more recent review of 57 person-environment congruence studies was conducted by Spokane (1985). His overall conclusion was that job satisfaction is substantially related to higher congruence scores. However,

he noted that many environments (home, school, social circle) may have a concomitant effect on occupational decisions and satisfaction.

Smart, Elton and McLaughlin (1986) noted three major limitations of the evidence supporting the congruence construct. First, most studies in Spokane's (1985) review were based on single occupational groups, thus limiting the generalizability of the findings. Second, generalized measures of overall job satisfaction were used, rendering it impossible to determine the degree to which congruence is related to specific aspects of the job. Third, no controls were provided for other correlates of job satisfaction. The authors also mentioned the Mount and Muchinsky (1978) study cited above, citing it as the most complete assessment of the congruence construct. However, they noted that Mount and Muchinsky's congruence-environment hypothesis was not equally valid for all of Holland's theme types.

To counter the problems of previous studies, Smart, Elton and Mclaughlin (1986) launched an impressive study involving an initial sample of 10,326 students from 487 colleges across the United States. After rigid sampling criteria were imposed, the actual study sample was reduced to 1,014. Subjects were initially tested to obtain Holland theme codes, and then surveyed upon finding employment to determine their level of job satisfaction. A generalized job satisfaction index was augmented by measures of

intrinsic and extrinsic job satisfaction. Data were analyzed using separate MANCOVA runs for males and females; the Holland theme scores and perceived congruence level were the independent variables, the three job satisfaction scores were the dependent variables, and size of organization and highest earned degree were the covariates. The authors found a significant difference among the satisfaction scores based on the level of congruence between current job and undergraduate major. Furthermore, in contrast to the Mount and Muchinsky (1978) study, the differences were consistent across Holland's six personality types. Finally, the lack of interaction effects indicated that congruence and job satisfaction is consistent across both personality type and gender.

The Smart, et al (1986) study is not without problems. Congruence was given as a perceived score, not a measured score. Subjects were asked to rate their perception of the degree of congruence between their current job and former training. Spokane (1985) had concluded that congruence was best measured using at least three codes, and that the agreement indexes of Zener-Schnuelle, Kwak-Pulvino or Iachan provided the most accurate measures. A more sophisticated congruence measure may have affected the interaction results.

b) Consistency

The research into the consistency construct has produced more varied results. Holland, Sorenson, Clark, Nafsiger, and Blum (1973) examined the stability of the work histories of 973 men between the ages of 30 and 39. They controlled for personality type by only using Realistic types, and analyzed work history over a 10 year span; men who had consistent codes were more likely to be more stable in their careers than those with inconsistent codes. Gottfredson and Lipstein (1975) studied 150 parolees and found that consistency correlated significantly ($r = .18$) with job stability, but did not add significantly to the regression equation when other variables such as general educational development were considered. A study of 171 male Investigative subjects by O'Neil and Magoon (1977) evaluated the ability of the consistency scores to predict choice of major, occupation at graduation, and occupation five years after graduation. They concluded that the higher the consistency, the more predictable were the subjects. Finally, Gottfredson (1977) concluded that workers who experienced the greatest career stability had initial jobs of high consistency.

Barak and Rabbi (1982) studied 293 college students over a five year period in order to test the consistency construct. They concluded that the use of standardized tests (Self Directed Search, Vocational Preference Inventory

and Strong-Campbell Interest Inventory) to measure consistency was questionable. However, when consistency was defined by actual behaviors (i.e., choice of coloege major used to define type), it could be used to predict both future environment type and achievement. In a study producing similar results, Nafziger, et al. (1978) tested the predictive efficiency of three letter codes with 10,000 subjects over a three year period. They found only weak support for the consistency hypothesis; however, when actual job codes were used (as opposed to tested codes) to predict job code three years later, a highly significant level of agreement was found.

The use of behavioral indices of consistency raises more problems for the interpretation of the theory than they solve. Given the typical employment patterns of the North American worker, it would be highly unusual to find a low correlation between the occupational codes of workers over a three year interval. Thus, Nafziger's findings are not surprising, but neither do they add any support to the consistency construct. A similar argument could be put forth for Barak and Rabbi's behavioral measures of consistency; one would expect high correlations between the code for the major in college and the code for subsequent employment.

Correlation and regression analysis have been the primary tools for the evaluation of the consistency

construct. These may not be the most effective techniques, given the theory of the construct. Holland had hypothesized that high consistency scores would result in greater efficiency of prediction; thus, by implication, lower consistency scores would result in a decrease in predictive efficiency. ANOVA procedures (i.e., a 2-way ANOVA, with consistency groups such as "high", "moderate", and "low") may be better suited to the testing of the theory than simple correlations, by allowing for a comparison of the distribution of scores across the different levels of consistency.

c) Combinations of Constructs

Most of the research utilizing Holland's theories combine two or more of the basic constructs. Holland, Gottfredson, and Nafziger (1975) administered the Self-Directed Search to 1,837 subjects, and found that a combination of consistency plus differentiation scores were able to predict scores on a test of decision-making, but at a relatively low level of efficiency. O'Neil (1977) used the same combination to assess academic achievement over a four year span with 127 college freshmen. Neither differentiation nor level of consistency was able to predict achievement.

A study of congruence and differentiation was conducted by Wiggins, Lederer, Salkowe and Rys (1983). The Vocational Preference Inventory (VPI) was administered to 247 teachers

and the results compared to a measure of job satisfaction. In the regression analysis, congruence was found to be the best predictor of satisfaction , followed by differentiation (R = .37).

Several studies have examined the constructs of congruency, consistency and differentiation. Nafziger, Holland and Gottfredson (1975) measured the satisfaction level of 1,878 students over a three year period. Congruency was found to have a significant effect on level of satisfaction, but neither consistency nor differentiation were found to be significant. Vaitenas and Wiener (1977) compared voluntary career changers to individuals who were still interested in the same career. They found that career changers had lower congruency scores than the control group, and that career change was positively associated with consistency. Differentiation appeared to have no effect. Peiser and Meir (1978) used these constructs to predict vocational satisfaction. They concluded that a positive relationship between consistency and differentiation will occur if the individual's interest field is congruent with their occupational field. Neither consistency nor differentiation was correlated with satisfaction if there was no congruence.

d) Identity

The identity construct is relatively new to the Holland model, and as such, has been subjected to less analysis. An

empirical measure of identity was developed by Holland, Gottfredson and Power (1980); the instrument they developed became known as My Vocational Situation (MVS), which contained an Identity Scale. In their study of high school students, they found that high identity scores were negatively associated with expressed need for help in a variety of areas. Henkels, Spokane and Hoffman (1981) studied 92 undergraduate students using MVS and concluded that vocational identity is related to personality and adjustment, and that subjects who had high scores on the Identity Scale tended to be better adjusted than those with low scores. The Identity Scale may also be a good indicator of occupational commitment (Grotevant and Thorbecke, 1982).

e) Advanced Scaling Procedures

Recent advances in research associated with Holland's model have been made with respect to the measurement of the three original constructs (congruence, differentiation, and consistency). In general, attempts were made to increase the precision of the measurements, and thereby improve the ability of the constructs to make valid descriptions and predictions.

Ronaldo Iachan (1984) has proposed a refined model of congruence assessment based on a weighted matrix. The matrix is formed by placing the letters of the environmental code along the vertical axis, and the letters of the person's code along the horizontal axis. (The actual matrix

system may be used to obtain a measure of agreement between two "judges" on any three-point ranking criteria.) Each cell of the matrix represents a comparison between the two codes; cell (1,1), for example, would represent a comparsion between the first position of each of the two codes. In a similar fashion, cell (1,2) compares the first letter of the first code to the second letter of the second code, and so on.

Iachan (1984) assigned a system of weights according to an hierarchy of importance amongst the comparative positions of the three-letter theme codes (see Figure III). He proposed an hierarchy in which the weight assigned to a match between the first position of each three letter code (i.e. cell 1,1) is greater than that assigned to a match between the first letter of one code and the second letter of the other (i.e., cell 1,2 or cell 2,1). The complete hierarchy of weights is given by:

$$w(1,1) > w(1,2) > w(2,2) > w(1,3) > w(2,3) > w(3,3)$$

where

w = the weight assigned to each cell position

(i,j) = cell determined by a matrix formed with a three letter code along each axis

The matrix of weights thus reflects the importance of the relative positions of each letter in the code. The overall measure of congruence is simply the sum of the weights

assigned to each "match" found in the matrix. For example, an R-I-A individual working in an I-A-R environment would receive a congruence score of "16". Matches were found in cells (1,2), (2,3), and (3,1). The weights assigned to these cells are 10, 2 and 4, respectively, which sum to a total of 16.

FIGURE III

IACHAN INDEX OF AGREEMENT

Weights Used to Assess Agreement

Between Two Three-Letter Codes

Individual's Vocational Code			
Environment Code	First Letter	Second Letter	Third Letter
First Letter	22	10	4
Second Letter	10	5	2
Third Letter	4	2	1

(Adapted from Ronaldo Iachan (1984) "A Measure of Agreement for Use with the Holland Classification System", in Journal of Vocational Behavior, 24, 133-141.

Although the Zener-Schnuelle Index is much easier to use, it provides for less discrimination of possible three letter code comparisons. While the Iachan Index potentially provides a more accurate description of the degree of congruence, Iachan (1984) notes that there is a need to determine whether or not the advances provide a significant improvement over the older index.

The differentiation construct, when measured in the traditional way, produces, at best, mixed results (Holland, 1985). Monahan (1987) suggests that either the construct itself is not valid, or the means of measuring it need improvement. She suggested that the traditional method of obtaining a differentiation score ($X_1 - X_6$) does not accurately reflect Holland's proposition of a marked distinction in scores, and that a better measure would be to subtract the second highest theme from the highest (i.e. $X_1 - X_2$). For example, the RIASEC scores of 24,14,7,18,15,21 that yielded a differentiation score of 17 using the traditional method would yield a score of 3 using Monahan's approach. Her comparison of the results of both measures of differentiation on a sample of 90 subjects led to her conclusion that the latter method had increased predictive power. However, she cautions that more work is needed in the operationalization of the construct.

Robert Strahan (1987) has developed a modified measure for the consistency construct that is similar in principle

to Iachan's weighted congruence measure. Strahan has expanded the derivation of the consistency score from a two-position comparsion to a three-position comparison, and established a set of weights for all potential comparisons. Strahan's model is based on the assumption that employing the third letter provides a more comprehensive, and therefore more highly differentiated index. Using the three letter code results in three possible consistency comparisons: 1 vs. 2; 1 vs. 3; and 2 vs. 3. Strahan assigned values to each of these comparisons (x_1, x_2, x_3) based on the traditional two-point method (2, 1, or 0 for adjacent, once removed, and opposite themes, respectively). A set of weights, $c_1 > c_2 > c_3$ was then calculated (the actual values of the weights chosen were 6, 2 and 1, respectively) and inserted into the equation $Y = c_1x_1 + c_2x_2 + c_3x_3$. This representation provided a 10-point range of values for the consistency construct (see Figure IV). Strahan's index possesses a certain "face" validity, but it has not yet been tested in actual research. It will be necessary to determine whether or not these changes make any difference to the operationalization of the consistency construct.

FIGURE IV

STRAHAN'S MEASURE OF CONSISTENCY

Three-letter Codes						CONSISTENCY
RIA	IAS	ASE	SEC	ECR	CRI	9
RIS	IAE	ASC	SER	ECI	CRA	7
RIE	IAC	ASR	SEI	ECA	CRS	8
RIC	IAR	ASI	SEA	ECS	CRE	10
RAS	ISE	AEC	SCR	ERI	CIA	3
RAE	ISC	AER	SCI	ERA	CIS	4
RAC	ISR	AEI	SCA	ERS	CIE	5
RAI	ISA	AES	SCE	ERC	CIR	6
RSE	IEC	ACR	SRI	EIA	CAS	1
RSC	IER	ACI	SRA	EIS	CAE	2
RSI	IEA	ACS	SRE	EIC	CAR	2
RSA	IES	ACE	SRC	EIR	CAI	1
REC	ICR	ARI	SIA	EAS	CSE	6
REI	ICA	ARS	SIE	EAC	SCR	5
REA	ICS	ARE	SIC	EAR	CSI	4
RES	ICE	ARC	SIR	EAI	CSA	3
RCI	IRA	AIS	SAE	ESC	CER	10
RCA	IRS	AIE	SAC	ESR	CEI	8
RCS	IRE	AIC	SAR	ESI	CEA	7
RCE	IRC	AIR	SAI	ESA	CES	9

(Adapted from R. Strahan (1987) "Measures of Consistency for Holland-Type Codes", in Journal of Vocational Behavior, 31 37-44.

f) Job Search and Holland's Constructs

Research has tended to focus on either dynamics of the job search process, or on Holland's constructs, but rarely on both. In fact, very little can be found that attempts to forge links between theories of careers and job search.

Studies that focus directly on the job search process tend to be prescriptive (i.e. provide accounts of programs or intervention strategies to facilitate job acquisition) or descriptive (i.e. attempt to describe features of the "job market"). Hopkins and Johnson (1985) typify the former, and Dzubow (1985), and Amundson and Borgen (1982) the latter. Thus, while Dzubow speaks of "job-search effectiveness", "job-search efficiency" and "job satisfaction", he does so in terms of the perceptions of job-seekers and employers as gleaned from a general survey. For example, Dzubow asked his participants to indicate how long they believed it would take a recent graduate to find a job. At best, his results provide an indication of the differing perceptions among job-seekers and potential employers.

Some attempts have been made to identify characteristics of successful job-seekers. Kanfer and Hulin (1985) followed a small sample of individuals who had been layed off from their jobs in an attempt to determine factors related to success in finding other employment. They found that people who were re-employed one month after their

layoff were more confident in their job search skills, and demonstrated more job search behaviors than were those who were unemployed after the same period. In their conclusions, Kanfer and Hulin (1985) related their findings to issues of self-esteem, and suggested that "future research on potential personality determinants of specific self-efficacy expectations is clearly needed" (p. 845).

Very little attention has been paid to the relationship between variables critical to vocational development and actual success in the job search process. Stevens (1973) attempted to link job-seeking behavior to individual personality characteristics in 161 seniors in college. She found that a significant relationship existed between personality characteristics and coping behavior in seeking jobs. From this, she implied that the success of self-concept implementation (as per Super's theory) was also affected by these characteristics. In another study, Aiken and Johnson (1973) found a significant relationship between Holland's consistency construct and the frequency of (vocational) exploratory behavior.

Summary

Holland's theory of vocational choice proposes a series of inter-relationships between vocational personalities and work environments. The theory provides a framework for describing the mechanisms of vocational choice, and for

understanding the developmental context of one's career and life course.

The research reviewed thus far provides substantial support for Holland's typology and the construct of congruence. The evidence for both differentiation and consistency is somewhat divided; these constructs appear to have validity under certain constraints. Recent advances in the operationalization of the constructs may help to clarify their utility. The identity construct, while promising, needs further validation. These constructs were evaluated, for the most part, in terms of achievement or satisfaction; most were conducted in the United States.

Practitioners of the theory generally make the assumption that once an individual's vocational personality has been identified, a suitable work environment can be obtained. However, none of the studies reviewed thus far have addressed the relationship between Holland's constructs and the ability of individuals to obtain employment. This represents an important gap in our ability to apply the theory to specific vocational counselling situations.

Holland did not specifically address the issue of success in obtaining employment; however, he did make the following assumptions with respect to job changes and unemployment (Holland, 1985):

a) for people who are in an incongruent environment, those who are differentiated and consistent will be the most successful in finding a new environment.

b) effectively coping with occupational change and/or unemployment is related to personality type. The types can be placed in the following order of success: S-E-A-I-R-C.

c) effectively coping with occupational change and/or unemployment will be positively associated with high levels of consistency and identity.

The general context of Holland's theory implies that the vocational personalities of individuals affect all dimensions of their life-career span; the assumptions noted above suggest that the theory may be extended to predicting the ability of individuals to cope with unemployment and/or occupational changes. However, no research has been found which actually tests these assumptions.

The purpose of this study was to examine the relationship between Holland's constructs (theme scores, vocational type, congruence, consistency, differentiation and identity) and success in obtaining employment. Three additional predictors were included in the assessment: the age of each individual, and amount of previous job experience, both full and part time. The job-seekers were recent graduates of a technical training program.

Four criteria were used for measuring success in the job search:

i) employment status;

ii) relationship of employment to training

iii) number of days of employment

iv) starting salary

Definitions of Holland's Terms

The general terms used in this study were presented in Chapter I; the following terms provide a review of the terminology found in Holland's theory.

Vocational Theme, or Theme: the description of one of the six primary personalities identified by Holland. They are: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional.

Vocational Type: the three digit code representing an individual's vocational personality. The type is determined by the three highest theme scores on an assessment such as The Self-Directed Search.

Differentiation: the degree to which an individual can be clearly defined by one particular theme.

Congruence: the degree of compatibility between an individual's personality type (vocational type) and his/her environment. For the purposes of this study, the environment was defined as the academic environment (i.e. program) prior to graduation.

Consistency: the degree of similarity among the three sub-codes of an individual's vocational type.

Identity: the degree to which an individual possesses a relatively clear and stable picture of one's vocational self.

Success in the Job Search: the ability to find employment, as measured by the four criteria variables defined previously. The four criteria essentially represent different views of job search success, and were therefore treated as separate measures.

CHAPTER III

METHODOLOGY

This section will describe the sample, instruments, data collection procedures, and the data analysis procedures that were used for the study.

1. THE SAMPLE

A large population of job seekers can typically be found in the graduating class of post-secondary institutions. The Northern Alberta Institute of Technology (NAIT) has an active placement center and a diversity of programs; therefore, permission was requested to study students from three separate program areas. The selection of appropriate programs for study was based on the following criteria:

i) Holland environmental theme code. In order to provide an adequate test of Holland's theory, programs representing three distinct environmental themes were selected.

11) Length of program. Only two year programs were considered, and students had to be eligible for graduation in the Spring of 1987.

iii) Number of students in the program. A minimum of 75 students were deemed to be necessary for testing in each of the three program areas.

iv) Permission from Department Heads and/or Program Heads.

v) Data from previous employment placement surveys (conducted yearly by the N.A.I.T. Placement Center) were reviewed, and programs selected on the basis of variable success in placement percentage (less than 90% of the graduates obtaining employment).

Based on the above criteria, three programs were selected: Electronics Engineering Technology (EET), Architectural Technology (AT), and Accounting (ACC). The total sample consisted of 352 students (232 males and 120 females). By program, the sample consisted of 121 EET students (117 male and 4 female), 88 AT students (47 male and 41 female) and 143 ACC students (68 male and 75 female). The age of the students ranged from 18 to 42, with an average age of 23.1.

2. THE INSTRUMENTS

Two of Holland's tests were used to obtain the data for each subject's theme scores and supporting constructs: the Self-Directed Search (SDS; Holland, 1985) and My Vocational Situation (MVS; Holland, Daiger and Powell, 1980). The SDS is a self-scored instrument which provides the user with a score for each of Holland's six occupational themes (RIASEC). My Vocational Situation is also a self-report test which is used to identify the barriers to deciding on an appropriate occupation. Although it contains three

scales (Vocational Identity, Occupational Information, and Barriers), only the Identity scale was used in the research.

The SDS is one of the most extensively used instruments in career counselling. Split-half reliability coefficients range from .83 to .95 (Holland, 1979). Test-retest reliabilities are similarily high. Tables of reliability and validity are presented in Appendix A.

Reliability coefficients for the Identity scale of MVS range from .86 for high school students to .89 for college students and workers (Holland, Daiger and Powell, 1980). A table of intercorrelations for assessing construct validity is also presented in Appendix A.

3. DATA COLLECTION

Prior to data collection, the program of research was submitted for ethics review to officials of both the University of Alberta and the Northern Alberta Institute of Technology (see Appendix C); furthermore, procedures were taken to ensure the confidentiality of the student participants in the study. Two files were established: a master file containing the list of participants with their corresponding research-assigned identification numbers, and a data file containing the identification number and corresponding research data. Only the latter file was stored on computer, eliminating the potential for identification of individual students through unauthorized

or accidental file access. Once all of the data had been collected and stored on the data file, the original master file was destroyed.

The SDS and MVS were administered to second year technology students during the second term of the year; the results from the testing provided the data for the predictor variables. Included on the demographic information sheet for the instruments were items requesting information regarding each individual's full and part-time work experience, and the native language of each subject. All testing was conducted within a four week span.

The data for the criteria variables were obtained from the Graduate Survey conducted annually by the N.A.I.T. Placement Center. Students were given copies of the follow-up survey at the time of testing, and were asked to return them to the Placement Center when they had obtained employment. Six months after graduation, those students that had not returned the survey were contacted by telephone to obtain the information. Of the 352 students who were tested in the spring, follow-up data was received for 321 (91%). The follow-up rate by program was as follows: Electronics - 93%; Accounting - 88%; Architecture - 94%. A sample of the follow-up questionnaire is provided in Appendix C.

A file for each subject was maintained. The data sheet for each subject initially contained personal

demographic data (age, sex, etc.), and the tested scores (vocational type, congruence, consistency, differentiation and identity). In addition, supporting data indicating amount of full or part-time work experience, and native language were also recorded. The Survey data was subsequently added, and included the criteria variables relating to success in the job search (employment status, relationship of employment to training, length of time to find employment, and salary).

Predictor Variables

A total of 20 variables were used as predictors in the study. The actual values for the variables were determined as follows:

1 - 6: Theme Scores. The actual tested score for each of the six occupational personalities (RIASEC), as measured by the SDS.

7 - 9: Vocational Type. The three-code representation determined by the three highest theme scores. A value of "1" was assigned to R, "2" was asssigned to I, and so on for the six Holland themes. Type was then represented as three variables: THEM1, THEM2, and THEM3.

10: Identity (I). The score obtained on the Identity subtest of MVS.

11: Differentiation (DIFF1). The difference between the highest and lowest scores on the SDS.

#12: Consistency (CONS1). Consistency scores of 1, 2, or 3 were assigned, based on the first two letters of the vocational type previously determined. A high level of consistency was assigned the value "3", and is represnted by adjacent codes on Holland's hexagonal model (eg., R-I, R-C). Moderate consistency was assigned a value of "2", and was represented by theme scores which were once removed on the hexagonal model (eg., R-A, R-E). Low consistency, as represented by opposite theme scores (eg., R-S), was assigned the value of "1".

#13: Congruence (CONG). Congruence, for the purpose of this study, was defined as the degree of similarity between an individual's tested vocational type and the environmental code for their training program. (Procedures for determining the latter are described in the following section). Iachan (1984) has developed a weighting system which accounts for the agreement between, and relative importance of the position of each of the themes in the compared codes. Most of the studies reviewed in the literature have utilized the Zener-Schnulle Index of Agreement; this method is a generalized procedure, and does not allow for sufficient discrimination among the possible outcomes. Iachan (1984) noted "the result is that outcomes that are clearly not equivalent have the same measure of agreement" (p. 136). In a recent update to his theory, Holland (1985) endorsed the use of the Iachan Index for

assessing congruence; therefore, the Iachan Index was applied in this study. Table I of Appendix B contains an example of both weighting systems.

#14: Previous Job Experience, Full-Time (FT). Number of months of full time job experience prior to entering the program.

#15: Previous Job Experience, Part-Time (PT). Number of months of part-time job experience at graduation.

#16: Native Language (ESL). Students who declared "English" as their mother tongue were assigned the value "0"; those who indicated a mother tongue other than English were assigned the value "1".

#17: Sex (SEX). The value "1" was assigned to males, and "2" to females.

#18: Age (AGE). Age in years, as of the date of testing.

In addition to the traditional methods of calculating differentiation and consistency, two alternative methods were also calculated:

19: Differentiation 2 (DIFF2). The score obtained by subtracting the second highest theme score from the highest theme score (Monahan, 1987).

20: Consistency 2 (CONS2). A weighted measure that assigns consistency values of 1 to 10, based on the three-theme vocational type, rather than the traditional

two-theme comparison (Strahan, 1987). A full description of the weighting system is provided in Table II of Appendix B.

Criteria Variables

Four criteria were used to assess success in the job search process. The criteria were determined as follows:

#1: Employment Status (STAT). Working full-time ("1"); working part-time ("2"); or not working ("3") 6 months after graduation.

#2: Days of Employment (DEMP). Number of days of employment, after graduation. Subjects were asked to note the date on which they commenced employment; the actual value for DEMP was recorded as the number of days of employment from graduation to the follow-up cut-off date of November 1, 1987 (i.e., six months from graduation). This method of coding was chosen to account for students who had more than one job during this period. However, it still provides a measure equivalent to length of time required to find employment; the basic difference is that direction of relationship is reversed.

#3: Category of Employment (RELT). Subjects were asked to indicate their perception of whether their employment was related or unrelated to the training they took. Three categories were used: employment directly related to training (1); employment indirectly related to training (2); and employment unrelated to training (3).

#4: Salary (SAL). Subjects were asked to indicate their starting monthly salary.

Determining Program Environments

Once the data collection was completed, the program environments could be determined for the purpose of calculating each student's congruence score. There are at least five methods of obtaining an environmental (i.e., program) code. The first method is to use existing sources, and assume that the code predicted in the source is the same as the sample being studied. The other four methods all involve conducting an actual asessment of the environment in question; a code may be established by using the mean, median or mode of test scores, or a weighting system may be applied to the frequencies of themes obtained through testing.

The use of existing sources is the quickest means of determining an environmental code. For example, one could refer to The Occupations Finder (Holland, 1986), which lists several hundred occupational titles and their respective three-theme codes. However, many of these are only estimates, or are based on small and/or non-Canadian samples; actual occupational codes often differ from the predicted ones (Madill, 1986). In addition, training programs may lead to more than one occupation, so predicted occupational codes may not be appropriate.

An environmental assessment, in which tested scores are available, typically uses mean, median or modal theme scores to assess environmental type. Spokane (1985) noted that "it is also possible to classify an environment by testing its inhabitants and using average scores from interest inventories to determine the predominant Holland type in that environment. Medians or modes are better estimates of predominance than means in such 'census' studies" (p. 309). The problem with using a mean score is that unusually high or low scores may skew the distribution; although this is not as serious a problem with a large sample, the nature of the Holland profiles would suggest that medians or modes provides better estimates.

A fifth method of determining an environmental type is by weighting the frequencies of the occurrence of each theme type within the three positions of the individual vocational type; this was the method used in this study. Holland's (1985) theory emphasizes the importance of the primary theme in an individual or environmental code; subsequent themes are of secondary or tertiary importance to the classification. This priority was recognized by assigning weights of "3" to the first theme, "2" to the second theme, and "1" to the third theme in the code. The weights were then multiplied by the frequencies observed for each theme at each position of the code. For example, if the Realistic theme occurred 43 times in the first (THEM1) position, it

would receive a weighted score of 129 (43 X 3). The totals for each theme were then summed across the three positions of the code, and placed in rank order. The three themes with the highest weighted totals were defined as the environmental code for that program. Such a weighting system is further described in Table III of Appendix B.

4. DATA ANALYSIS

For each of the research questions and forms of analysis to follow, data were considered on two levels. On the first level, the sample was treated as a single group. Although it was expected that the overall predictive efficiency of the predictor variables would be lessened with this technique, the attempt was made in order to assess the global implications of the results. On the second level, the data were divided by the constituent program groupings, and analysis procedures repeated. These results were then used to address issues of predictability within specific environmental situations. All of the data analysis and file manipulation was conducted with the use of the SPSS^{X} (1986) statistical package.

The study was conducted in three phases. In the first phase, an environmental assessment was conducted. This was followed by a general search for relationships between the Holland predictor variables and the criteria for determining success in the job search. Finally, specific propositions

made by Holland with respect to the job search process were tested. The methods of data analysis for each phase are presented below.

Part I: Environmental Assessment

Two specific questions were addressed during the first phase of the study.

Question 1: What was the Holland environmental code for each of the three programs in the study?

An environmental assessment was conducted by testing the students in each of the Electronics, Architecture and Accounting programs with the Self-Directed Search. The weighted frequency method (described above) was used to obtain the summary code for each program.

Question 2: How did the environmental codes obtained for each program compare to the occupational codes predicted in The Occupations Finder (Holland, 1986)?

The obtained codes were simply compared to the predicted code, and similarities or discrepancies noted. Iachan's (1984) Index of Agreement was used to provide an additional measure of comparison of the two ratings.

Part II: General Search for Relationships

Four questions were raised in the second phase of the research.

Question 3: Are there any significant relationships between any of Holland's basic constructs and the determinants of success in the job search process?

The Pearson product-moment correlation is the basic tool for determining the existence and strength of relationships between two variables. The major restriction on this otherwise robust measure is that the variables must be at least interval in nature (Ferguson, 1976). The predictors which satisfied this criterion included the Holland theme scores (RIASEC), the supporting constructs (identity, congruence, differentiation, and Strahan's measure of consistency), and age. The traditional three-level method of determining consistency was not included in the correlational analysis because it is nominal in nature, and thus does not satisfy the restriction noted above.

The criteria variables of Salary and Days of Employment are ratio and interval variables, respectively, and were the only ones that could be used in standard correlational analysis.

In order to examine the potential relationships among the remaining nominal predictor and criteria variables, an analysis of frequencies using chi square was conducted. Ferguson (1976) noted that the application of the chi square statistic is appropriate for the testing of the independence

of two nominal variables. This technique involves the arrangement of the data into a contingency table, and analyzing the frequencies in each cell of the table. The expected frequencies used in the analysis were determined by assuming an equal distribution among the levels of the predictors after calculating the proportions observed in the criteria. For example, given a two-level predictor (such as sex), and a three-level criterion, in which 44% of the sample fell into the first category, the expected frequencies in that first category would be 22% for each of the two levels of the predictor. This process would be repeated for each of the remaining levels of the criterion. Contingency tables, and tests of independence using the chi square statistic, were calculated for the predictors THEM1, THEM2, THEM3, (representing the vocational type, or three-digit Holland code), CONS1, SEX, and ESL and the criteria variables STAT and RELT.

The comparison of the interval-level predictors to the nominal criteria was accomplished by temporarily recoding the former variables into nominal categories, using the median as a dividing point, and defining "high" and "low" categories for each.

Finally, analysis of variance procedures were used to compare mean differences between the subgroups of the nominal predictor variables noted above and the interval or

continuous criteria variables used in the correlation analysis.

Question 4: Does any combination of predictors significantly improve the prediction of job search success?

There were no a priori assumptions regarding the order in which the predictors should be entered into the prediction equation; therefore, a step-wise multiple regression analysis was utilized. This procedure involves the development of a prediction equation by introducing (in the order of greatest contribution to variance in the criterion) predictor variables one step at a time, until the increase in accounted-for variance is negligible.

Question 5: Is it possible to use the predictor variables to classify individuals into categories of success in the job search process?

A discriminant function analysis was conducted to test Question 5. The weighting system that was obtained was used to generate a discriminant equation that could be used to assign future students to the above categories (i.e., an estimate or prediction of job search "success").

All statistical analyses were conducted at the 95% confidence level ($\alpha < .05$). Levels of significance at or below .01 are noted.

Part III: Analysis of Holland's Specific Predictions

The wealth of data collected permitted the opportunity to explore a number of questions related to the primary research questions desribed above. In particular, the following additional questions were addressed:

Question 6: For individuals in an incongruent environment, are those who are more highly differentiated and of greater consistency more successful in coping with unemployment and/or job change?

The Iachan Index of Agreement (1984) used in this study provides measures of congruence that range from 0 to 28. Incongruent individuals were defined as being those whose congruence score fell below 13 (the value obtained when the same set of theme codes occur for both the individual and the comparison environment, but are in reversed order), which defines a minimum level of congruence.

Differentiation scores were divided into "High" and "Low" categories, using the median as the dividing point. Consistency, using the traditional method, was recoded to "High" (CONS1 = 3) or "Low" (CONS1 = 1 or 2). To test the predicted combination of high consistency with high differentiation, four categories of a new variable (CD) were defined: low consistency and low differentiation; low consistency and high differentiation; high consistency and low differentiation; and high consistency and hgh differentiation.

Once the data were recoded, analysis of variance procedures were used to compare the effects of the four levels of the combined consistency/differentiation variable with the criteria variables days of employment and salary; chi square analyses were used to assess the criteria variables of relation to training and status.

Question 7: Is effective coping with unemployment positively associated with high consistency and identity scores?

This question postulated by Holland (1985) is similar to Question 6, and was treated in a similar fashion. The Identity (I) variable was recoded about the median into two groups, representing high and low Identity scores. These two categories were combined with the two categories of consistency defined in Question 6 to form the four-level predictor variable CI. The four categories were low consistency and low identity; low consistency and high identity; high consistency and low identity; and high consistency and high identity. Analysis of variance techniques were used to compare the effects of the different levels of CI on the criteria variables of DEMP and SAL, and chi square analyses were conducted for comparison to STAT and RELT.

Question 8: Does effective coping with unemployment and/or job change follow the predicted Holland sequence of S-E-A-I-R-C?

Part of the answer to this question was provided by re-examining the correlations between the theme scores and the criteria identified in Question 1; further evidence was provided by examining the ANOVA and chi square results using the predictors THEM1, THEM2 and THEM3 and the criteria variables.

Question 9: For individuals who found employment directly related to their training, did their primary theme code have any effect on the length of time it took to find employment?

The environmental assessments conducted in Part I of the study (see Question 1) provided the initial material for answering Question 9. For each of the three programs in the study, the environmental assessment provided a three-letter Holland "program" code. Individuals were then assigned to one of three categories, based on the similarity of the first letter in their code to the first letter in their program code. The three nominal categories that were created were as follows: First letters of each code were identical; first letters of each code were adjacent on the hexagonal model; or first letters of each code were opposite on the hexagonal model.

Once the assignment to the above categories had been made, the students who had obtained employment in an area that was directly related to their training were selected for further analysis. If the primary theme in one's occupational code is dominant as suggested by Holland's theory, then those whose first theme matches that of the environment should find work in their area quicker than those whose primary code is different from the environmental code. This was tested by conducting an analysis of variance, using the three categories of similarity described above and the criterion variable representing number of days of employment (DEMP).

LIMITATIONS

The study did not utilize random sampling techniques; the basis for subject selection was availability, not particular group membership. Sample size was thus a factor of the number of available students within the particular programs selected.

No attempts were made to control for factors such as socio-economic status, intelligence, or academic ability. Each of these factors may also have had a bearing on the criteria variables. However, with respect to the latter limitation, some degree of control could be inferred from the fact that each of the three programs in the study required a minimum of a grade 12, including Grade 12 English

and preferably grade 12 mathematics, for admission. Furthermore, only graduates were included in the study; those students who were tested, but who were unable to graduate with their classmates, were not included in the employment follow-up. Thus, all of the students in the study possessed similar minimum academic qualifications upon entry to their respective programs, and all were successful in completing their program of study.

The results may be intuitively related back to developmental theory; no attempts were made to empirically relate the psychological need constructs of Holland to the developmental theories of Super.

There may also be some limitations in the interpretation of the data. For example, the Electronics program reflects a sex bias, in that only four of the 110 graduates were females. A more even male/female split occurred in the other two programs; 57 of the 113 Accounting students were female, as were 35 of the 77 Architecture graduates. The presentation of results makes reference to this potential difficulty, where applicable.

Some of the cell sizes were small and subject to sampling bias. For example, the analysis of Question 6 for Electronics students was based on 15 students (the number of graduates who met the low congruence criteria defined earlier). These results must be treated with caution.

Finally, the generalizability of the results to other populations is limited. Raw scores, rather than transformed z-scores, were used in the analysis. There are currently no norm groups available for the population of post-secondary school graduates studied in this research; furthermore, the sample sizes for each program were insufficient to generate local norms. The appropriateness of raw scores versus transformed z-scores remains an unresolved issue; Holland argues in favor of the former, whereas Prediger argues for the latter (Weinrach, 1984). The use of raw scores thus is consistent with the position of the theorist, at the possible expense of generalizability of the results.

CHAPTER IV

RESULTS OF THE ENVIRONMENTAL ASSESSMENT

The results of this study are presented in three chapters. In this chapter, detailed descriptive statistics of the variables in question are presented. From these data, the environmental codes for each of the three sub-groups are described. In Chapter V, the results of the analyses for Part II, the general search for relationships, are presented. Finally, the results of the analyses of the specific predictions made by Holland (Part III of the study) are presented in Chapter VI.

Description of the Variables

The original sample of 352 students, tested one month prior to graduation, was followed for a total of 6 months to determine subsequent employment status. Follow-up procedures were only conducted for those students who actually graduated; this reduced the total sample from 352 to 300. Table 1 presents the sample size by program.

In Tables 2, 3 and 4, descriptive statistics are presented for the interval level predictor and criteria variables for the graduates of each of the three programs. In addition to the Holland predictor variables, previous full-time (FT) and part-time (PT) employment, as well as age are described. The mean, median, and modal score for each of Holland's six personality types (RIASEC) were utilized to

provide a comparative check on the environmental code. The code established for each program environment using each of these methods is presented in Appendix B. The values were also checked as a generalized method of ensuring a relative distribution among both predictor and criteria variables.

Table 5 provides frequency counts for the nominal predictor and criteria variables. It should be noted that the frequencies for the criterion Relation to Training (RELT) are less than the totals reported for the other variables. This discrepancy is due to the manner in which RELT was initially defined; that is, RELT represents categories of employment, and therefore consists only of responses from those students who were employed at the time of the study. For example, 94 of the 110 students from the Electronics (EET) program were employed six months after graduation; these 94 students were then asked for an indication of the relationship of their employment to their training. Thus, the frequencies for the criterion variable RELT for students in the EET program sum to 94, instead of the stated sample size of 110.

The Environmental Assessment

Two specific research questions were posed during the environmental assessment; the first focused on determining the Holland code for each of the programs under study, and the second examined the similarity of the obtained codes to

those predicted for each of the groups. The results of each are presented below.

Question 1: What is the Holland environmental code for each of the programs in the study?

A weighting system was used to obtain the environmental code for each program. In Holland's (1985) theory, an individual's primary occupational personality type is represented by the first letter of his or her three letter vocational personality code. Subsequent letters of the code represent secondary and tertiary aspects of the individual's vocational personality. This primacy was recognized by weighting the frequencies of the occurrence of each of the six theme types in the first, second and third positions of the occupational code (i.e. variables THEM1, THEM2 and THEM3) by factors of three, two and one, respectively. The sum of the weights were calculated for each of the six theme types, and placed in rank order. The three highest theme types were then identified as the environmental code for the given program. Table 6 presents the frequencies, weighted frequencies, and subsequent environmental code for each of the three programs.

The environmental theme code for Electronics Engineering Technology (EET) students was determined to be RIE. The Realistic (R) theme was coded in the first position of the three-digit occupational codes 55 times, 35 times in the second and 12 times in the third, for a

weighted score of 247. This was followed closely by the Investigative (I) theme, with frequencies of 43, 40 and 14, respectively, for a weighted code of 227. The third code, Enterprising (E), obtained a weighted code of only 75; thus, the EET environment is dominated by the R and I themes, with other themes playing only a minor role.

The pattern of the environmental code for Accounting (ACC) was the reverse of that for the Electronics program. The highest weighted code, in this case the Conventional (C) theme (weighted total of 301), was nearly triple that of the second theme, Enterprising (weighted total of 109). This was followed closely by the Investigative theme, with a weighted code of 105. Thus, the CEI code for the Accounting program is dominated by the Conventional theme, with the Enterprising and Investigative themes providing a distant cluster of secondary importance.

The environmental code for the Architectural Technolgy (AT) program represents a more balanced distribution of theme scores. The highest weighting, with a value of 120, was for the Artistic (A) theme, followed by Realistic (R) at 103 and Investigative (I) at 89. Each theme would appear to contribute uniquely and proportionately to the overall environmental code for AT students, rather than in clusters of similar weights as was the case for each of the other two programs.

Question 2: How do the environmental codes obtained for each program compare to those predicted in the Occupations Finder (Holland, 1986).

The Occupations Finder for the Self-Directed Search (Holland, 1986) predicts a code of IRE for electronics technicians. The obtained code of RIE is only slightly different from that predicted, especially considering the closeness of the weighted scores for the realistic and investigative themes.

The Occupations Finder (Holland, 1986) does not list a specific code for accountants; rather, a variety of codes are listed, depending on the specific kind of accounting performed. For example, a tax accountant is represented by the code ECS, while more generalized functions such as accounting clerks and certified public accountants are designated as CIS. The high weighted score for the C theme obtained for the accounting students in this study would suggest that the Conventional occupational personality is the most important contributor to the accounting environment, regardless of which field of accounting the individual chooses to specialize in.

The expected code for architectural students presented in The Occupations Finder (Holland, 1986) is AIR. This is relatively close to the obtained code of ARI. In either case, the dominant theme is Artistic, with subsequent combinations of investigative and realistic themes.

The weighted environmental codes were used to establish levels of congruence for each individual in the sample. The students' occupational theme code was compared to the environmental theme code for their respective programs using the Iachan (1984) index of agreement, as described in Appendix B. The congruence variable was then added to the list of predictors; the descriptive statistics for Congruence (CONG) are presented in Tables 2, 3 and 4.

Table 1

Sample Size by Program

Program	Number Tested	Number Graduated
Electronics (EET)	121	110
Accounting (ACC)	143	113
Architecture (AT)	88	77
Total	352	300

Table 2

Descriptive Statistics: Electronics Graduates (N = 110)

	MEAN	S.D.	MEDIAN	MODE	RANGE	MISSING
PREDICTORS						
R	32.96	6.77	33.5	22	32	0
I	31.54	7.19	30.0	27	28	0
A	14.74	8.00	13.5	17	38	0
S	22.52	7.59	22.0	20	39	0
E	22.57	8.70	23.0	23	38	0
C	19.04	8.45	17.0	13	39	0
DIFF1	24.39	6.18	25.0	27	31	0
DIFF2	6.14	4.63	5.0	3	19	0
CONS1	2.64	0.66	3.0	3	2	0
CONS2	6.92	2.24	7.0	8	9	0
CONG	21.40	6.23	21.5	27	23	0
IDEN	12.02	3.65	12.0	15	14	0
FT	40.69	50.92	18.5	0	216	0
PT	11.65	19.15	0.0	0	90	0
AGE	23.59	4.33	22.0	20	20	2
CRITERIA						
SAL	1474.11	449.68	1458.0	1280	2754	8
DEMP	103.27	59.46	109.5	181	181	5

Table 3

Descriptive Statistics: Accounting Graduates (N = 113)

	MEAN	S.D.	MEDIAN	MODE	RANGE	MISSING
PREDICTORS						
R	18.51	8.81	17.0	14	34	0
I	25.51	7.56	25.0	22	31	0
A	17.10	8.57	17.0	12	35	0
S	26.03	8.77	24.0	20	40	0
E	26.89	7.96	26.0	26	39	0
C	37.42	5.84	38.0	39	28	0
DIFF1	26.48	6.95	25.0	22	35	0
DIFF2	6.97	5.07	6.0	5	27	0
CONS1	2.31	0.61	2.0	2	2	0
CONS2	6.12	2.59	6.0	4	9	0
CONG	22.03	5.86	24.0	24	22	0
IDEN	12.28	3.99	13.0	16	17	0
FT	34.27	40.62	21.0	0	216	0
PT	17.51	25.61	2.0	0	96	0
AGE	23.19	4.01	22.0	20	18	0
CRITERIA						
SAL	1423.91	423.70	1416.0	1200	2600	37
DEMP	122.49	58.79	147.0	181	181	40

Table 4

Descriptive Statistics: Architecture Graduates (N = 77)

	MEAN	S.D.	MEDIAN	MODE	RANGE	MISSING
PREDICTORS						
R	27.09	8.12	27.0	26	38	0
I	26.61	8.11	24.0	22	37	0
A	28.60	9.64	27.0	21	38	0
S	23.46	7.95	23.0	29	33	0
E	24.67	8.90	25.0	22	40	0
C	19.07	8.10	18.0	11	42	0
DIFF1	20.61	6.82	20.0	26	38	0
DIFF2	5.70	4.69	4.0	4	19	0
CONS1	2.35	0.68	2.0	3	2	0
CONS2	6.47	2.62	6.0	8	9	0
CONG	15.49	8.90	14.0	24	28	0
IDEN	12.37	3.48	12.0	10	12	1
FT	26.22	34.05	12.0	0	144	3
PT	16.68	22.11	8.0	0	84	3
AGE	22.22	4.49	21.0	19	24	0
CRITERIA						
SAL	1244.04	339.78	1200.0	1200	2000	26
DEMP	118.44	54.77	122.0	181	178	22

Table 5

Frequency Counts for Nominal Variables

VARIABLE	CODE	FREQUENCY EET (N=110)	ACC (N=113)	AT (N=77)
THEM1	R	55	5	18
	I	43	7	13
	A	0	0	29
	S	4	8	4
	E	5	7	7
	C	3	86	6
THEM2	R	35	10	19
	I	40	28	13
	A	6	6	12
	S	10	20	12
	E	15	31	18
	C	4	18	3
THEM3	R	12	10	11
	I	18	28	24
	A	6	13	9
	S	28	20	15
	E	30	31	14
	C	16	7	4
ESL	ENG	89	97	72
	ESL	21	16	5
SEX	MALE	106	56	42
	FEMALE	4	57	35
STATUS	FULL TIME	79	82	57
	PART TIME	15	8	9
	UNEMPLOYED	16	23	11
RELT	DIRECTLY	58	67	41
	INDIRECTLY	18	10	10
	UNRELATED	18	13	6
	UNKNOWN	0	0	9

Table 6

Environmental Codes, By Program

PROGRAM		R		I		A		S		E		C	
		f	wf	f	wf	f	wf	f	wf	f	wf	f	wf
EET	THEM1	55	165	43	129	0	0	4	12	5	15	3	9
	THEM2	35	70	40	80	6	12	10	20	15	30	4	8
	THEM3	12	12	18	18	6	6	28	28	30	30	16	16
	TOTAL		247		227		18		60		75		33
	CODE:	RIE											
ACC	THEM1	5	15	7	21	0	0	8	24	7	21	86	258
	THEM2	10	20	28	56	6	12	20	40	31	62	18	36
	THEM3	10	10	28	28	13	13	29	29	26	26	7	7
	TOTAL		45		105		25		93		109		301
	CODE:	CEI											
AT	THEM1	18	54	13	39	29	87	4	12	7	21	6	18
	THEM2	19	38	13	26	12	24	12	24	18	36	3	6
	THEM3	11	11	24	24	9	9	15	15	14	14	4	4
	TOTAL		103		89		120		51		71		28
	CODE:	ARI											

f: frequency
wf: weighted frequency
weighting system: (f)THEM1 X 3 + f(THEM2) X 2 + f(THEM3) X 1

CHAPTER V

RESULTS OF THE GENERAL SEARCH FOR RELATIONSHIPS

The four general research questions postulated for the second part of this study (see Chapter I) were analyzed in two phases. In the first phase, the data were treated as a unified sample (N = 300), and appropriate statistical measures conducted. In the second phase, each of the three program groups were treated as independent groups, and the statistical analyses repeated.

Analysis of Question 3

The third research question was posed to determine whether or not any of the Holland predictors were related to success in the job search process, as defined by the four criteria variables. Specifically, the question was posed as follows:

Question 3: "Is there a significant relationship between any of Holland's basic constructs and the determinants of success in the job search process?".

1. Correlational Analysis

The basic tool used to assess the existence and strength of relationships between the predictor and criteria variables was the Pearson product-moment correlation. The primary restriction on the application of the Pearson-r statistic is that variables must be at least interval in nature (Ferguson, 1976). Eleven of the Holland predictor

variables satisfy this criterion: the scores obtained for each of the theme types (R, I, A, S, E, and C); the support constructs of differentiation (both the standard measure, represented as DIFF1 and the Monahan method, represented as DIFF2), congruence (CONG), identity (IDEN) and the Strahan measure of consistency (CONS2). The original method of assigning a consistency value (designated CONS1 in this study) produces nominal categories, and was therefore not included in the correlational analysis. The criteria variables that satisify the interval level requirement include the number of days of employment obtained since graduation (DEMP) and the starting salary (SAL). Table 7 presents the Pearson-r correlations for the whole sample, and Tables 8, 9 and 10 present the correlations for the Electronics, Accounting and Architecture programs, respectively. Levels of significance at the .05 level are noted.

Whole Sample

With the three sub-groups combined, five of the Holland predictors yielded significant correlations with the predictor variable of Salary (SAL). Positive correlations were obtained for the realistic (R) theme ($r = .154$), differentiation as measured by both DIFF1 ($r = .152$) and DIFF2 ($r = .122$), and identity (IDEN; $r = .140$). A negative correlation was obtained between the artistic (A) theme and salary ($r = -.143$). Thus, higher realistic, differentiation

and identity scores tended to result in higher salaries, whereas a high artistic score was negatively related to salary. It should be noted that although the correlations mentioned above were significant, they were small; the highest, for the realistic theme, accounted for only 2.4% of the variance in salary.

The additional predictors of full-time employment (FT), part-time employment (PT) and age (AGE) each yielded higher correlations than any of the Holland predictors. Positive correlations were obtained for both FT ($r = .278$) and AGE ($r = .237$). A somewhat surprising result was the negative correlation between part-time employment (PT) and salary ($r = -.170$). The amount of part-time employment a student had was negatively related to their starting salary after graduation.

Table 7 indicates that four of the Holland predictors were significantly correlated with days of employment (DEMP): the investigative (I) theme, differentiation as measured by both DIFF1 and DIFF2, and identity (IDEN). Once again, the correlations were small; the highest correlation, between differentiation (DIFF1) and DEMP ($r = .150$) accounted for only 2.25% of the variance. An identical coefficient, but in a negative direction, was found between the Investigative (I) theme and days of employment. Thus, higher differentiation and identity scores were associated with a greater number of days of employment after graduation

(i.e. shorter period of unemployment after graduation). High investigative scores had the opposite effect; a high I score was associated with fewer days of employment.

Two of the three non-Holland predictors were significantly correlated with days of employment. The highest coefficient of correlation amongst all predictors on the DEMP variable was obtained for previous full-time employment (FT; r = .167); AGE was also positively correlated with days of employment (r = .133). Thus the older the students, and the more full-time job experience they had, the sooner they found employment.

For both criteria variables of salary and days of employment, the original method of calculating differentiation (DIFF1) yielded higher correlations than the Monahan method (DIFF2). This pattern was repeated for each of the three sub-groups (see Tables 8, 9 and 10). However, the correlation between these two measures (see Table 1 of Appendix C) is only .464, indicating 21.53% shared variance. It is possible that although purporting to measure the same thing, these two methods of calculating differentiation actually measure slightly different concepts.

Electronics Program

A different set of predictor-criteria observations result when the sample is considered by program. Table 8 shows that a total of six of the Holland predictors for the Electronics (EET) students were significantly correlated

with salary (SAL). Positive relationships were found for the realistic (R) theme (r = .219), and differentiation (DIFF1; r = .301). Inverse relationships were found between salary and the investigative (I) theme (r = -.204), the conventional (C) theme (r = -.389), and consistency (CONS2) (r = -.217). Thus, higher salaries were associated with higher realistic and differentiation scores, and with lower conventional, investigative and consistency scores.

Two of the non-Holland predictors were significantly related to salary. Previous full-time employment (FT) was positively associated with salary (r = .202), whereas previous part-time employment (PT) was negatively associated with salary (r = -.280).

Table 8 also shows that only one predictor of any type was significantly correlated with days of employment after graduation (DEMP). A higher score on the realistic (R) theme was associated with a greater number of employment days (r = .244) for Electronics students.

Accounting Program

The correlation data for the Accounting (ACC) students is presented in Table 9. Significant positive correlations were found between four of the Holland predictors and salary (SAL). The Strahan measure of consistency (CONS2) was the best predictor (r = .241), accounting for 5.8% of the variance in salary. The enterprising (E) theme was next (r = .224), followed by the realistic theme (r = .216) and

identity (IDEN; r = .207). Salary was thus positively associated with high consistency, enterprising, realistic and identity scores.

Two of the non-Holland predictors were also positively associated with salary: AGE (r = .350) and previous full-time employment (FT; r = .275). The coefficient for the age-salary relationship was the highest of all the predictors, accounting for 12.25% of the variance in salary.

There was a marked difference between the Electronics and Accounting students in the number of significant correlations between the predictor variables and days of employment. Whereas only one such relationship was found for the former group, seven were noted for the latter. Among these, five of the Holland predictors were significant, with coefficients ranging from -.263 for the investigative theme to .216 for identity. The non-Holland predictors that yielded significant coefficients were previous full-time employment (FT; r = . 297) and AGE (r = .271). Thus, the number of days of employment was associated with higher full-time employment, age, differentiation (both DIFF1 and DIFF2) and identity scores, and with lower investigative and realistic theme scores.

Architecture Program

The correlational data for Architecture (AT) students is presented in Table 10. Three of the Holland predictors produced significant correlations with salary (SAL) as the

criterion. The highest correlation was with the enterprising (E) theme (r = .309), followed by artistic (A; r = -.277) and conventional (C; r = .235). For Architecture students, salary was positively associated with higher enterprising and conventional scores, and negatively associated with high artistic scores. Two of the non-Holland predictors also produced significant correlations to salary. A strong positive relationship was found between salary and amount of previous full-time employment (FT; r = .401). Age was also correlated to salary, although to a lesser extent (r = .248).

None of the Holland predictors were significantly correlated to the number of days of employment (DEMP) obtained by Architecture students. Significant correlations were obtained for the non-Holland predictors of previous full-time employment (r = .258) and AGE (r = .240). Older Architecture students, and those with previous full-time work experience, tended to find work earlier (i.e. have a greater number of days of employment after graduation).

2. Chi Square Analysis: Nominal Variables

Several of the variables used in this study were nominal, and therefore could not be included in the correlational analysis. These nominal variables were coded by membership in a particular group (eg. sex), and names (hence the term nominal) assigned to represent the various

subgroups (eg. male/female). Six predictor and two criteria variables fall under the nominal category: the occupatioanal code for each individual (represented by the predictor variables THEM1, THEM2, and THEM3), the original three-point code for defining consistency (CONS1), sex, and primary language (ESL) among the predictor set, and employment status (STAT) and relation to training (RELT) among the criteria set.

The chi square statistic was used to assess the relationships among the nominal predictor and criteria variables. Ferguson (1976) noted that chi square may be used to assess the goodness of fit to an existing model, or to determine the dependence/independence of two variables. It is the latter application of chi square which was used in this study.

Whole Sample

A summary of the chi square results for the whole sample is presented in Table 11A. Only one significant relationship was found: first language (ESL) and employment status six months after graduation ($\chi^2 = 8.05$). The full chi square table for this relationship is presented in Table 11B. Students whose first language is other than English, represented as code "1" for the ESL variable, were found to be in the "unemployed" status more frequently than was expected.

Chi Square Results by Program

The chi square analysis was also conducted separately for each of the three programs; these data are presented in Table 12A. None of the predictor variables were found to be related to the criteria in either the Electronics or Accounting programs. For the Architecture students, two significant relationships were found: the primary Holland theme code (THEM1) by relationship to training (RELT), (χ^2 = 18.99), and first language (ESL) by status (χ^2 = 9.28). The full chi square tables for these significant findings are presented in Tables 12B and 12C, respectively. For the Architecture program, students whose primary code (THEM1) was realistic (R) were employed in full-time positions more frequently than was expected, and those whose primary code was conventional (C) were in full-time positions less frequently than expected. Artistic (A) students were more frequently found in part-time positions than expected, and the unemployed group contained more investigative (I) and conventional types than expected. Thus, for Architecture students, primary theme code was related to the relationship of subsequent employment to their training.

The effects of students' first language were most apparent for the Architecture program; the significant relationship between first language (ESL) and status noted above for the whole group was not repeated for either of the Electronics or Accounting programs. The significant relationship found for the Architecture program (χ^2 =

9.2835) indicates that students whose primary language is other than English were more frequently unemployed than students whose first language is English. These results must be considered cautiously, due to the relatively small number of second language students in the Architecture sample (5).

3. Chi Square Analysis: Interval-Level Predictors

Chi square analysis procedures were also used in order to determine whether or not any relationships existed between the interval-level predictors (described earlier in the correlational analysis) and the nominal criteria. For each of the three programs, the median score for each predictor variable was determined (see Tables 2, 3 and 4). Each predictor was then divided into Low and High groups, with the division occurring about the median. Chi square results were calculated between each recoded predictor, and the nominal criteria variables STAT (status) and RELT (relation to training).

Electronics Program

The results of the chi square analysis for recoded interval-level variables for the Electronics (EET) program are presented in Table 13A. Two relationships were found to be significant; the detailed results of these analyses are presented in Table 13B. The conventional (C) theme was significantly related to relation to training (RELT), (χ^2 =

8.105). Students in the low conventional theme score group found employment directly related to their training more frequently than was expected, with those in the high conventional theme group finding employment that was not related to their training more frequently than was expected.

The second significant relationship found for the Electronics group was between differentiation (DIFF2) and relation to training (RELT; χ^2 = 9.2555). Students in the high differentiation group found employment directly related to their training more frequently than did those in the low differentiation group, and were less likely to be found in the indirectly or unrelated to training groups. This finding lends support to Holland's (1985) prediction that highly differentiated individuals would be more effective at coping with job changes and unemployment.

Accounting Program

The results of the chi square analysis for the Accounting (ACC) program are presented in Table 14. No significant relationships were found between any of the predictor variables and either of the criteria variables.

Architecture Program

No significant relationships were found between any of the predictors and relation to training for students in the Architecture (AT) program. However, significant relationships were found with status as the criteria, and the predictor variables of the conventional (C) theme, (χ^2 =

6.380), and age (AGE) (χ^2 = 6.15). These data are presented in Tables 15A and 15B. Students in the high conventional group were more frequently found in the "employed full-time" group, and less frequently in the "employed part-time" group than were the low conventional students. Also, contrary to expectation, younger students were more frequently employed full-time, and were less frequently unemployed, than their older counterparts.

4. ANOVA Results

The final set of procedures used to determine the existence of relationships between predictor and criteria variables involved the application of analysis of variance procedures to compare nominal predictors to interval-level criteria. The summary data are presented in Table 16A; significant findings for the whole sample are described in greater detail in Table 16B, and Table 16C presents significant ANOVA results by program.

Whole Sample

There were two significant results when the three programs were considered as a single sample. First, the mean starting salaries of graduates varied with the primary Holland theme code (THEM1). The analysis of variance results indicated a significant theme effect (F = 2.462). Individuals whose primary theme was realistic (R) earned the highest mean starting salaries, with those in the artistic

(A) group earning the lowest. Thus, an individual's starting salary after graduation was directly related to his or her primary personality theme code.

Starting salary was also found to be affected by the sex of the student. Males earned an average starting salary of $1,438.30, while their female counterparts earned an average starting wage of $1,288.70. The analysis of variance indicated a significant sex effect (F = 5.461). Thus, for this sample, women earned lower starting salaries than did men.

These results must be viewed cautiously, due to the disparate nature of the programs. For example, from Tables 2, 3 and 4, the program with the highest overall starting salary was the Electronics program ($1474.11), followed by Accounting ($1,423.91) and finally Architecture ($1244.04). The theme effect may be due to a dominance of the Realistic theme in the Electronics group, rather than an actual effect of personality. Similarily, the male dominated EET sample (106 males, 4 females) may have skewed the results in favour of a significant sex effect for the whole sample. For these reasons, it is more appropriate to consider analysis of variance on a program basis. These results are presented in Table 16C.

Electronics Program

One significant result was obtained from the Electronics (EET) program. The secondary occupational theme code (THEM2) was found to have a significant effect on starting salary (SAL; F = 2.639). Those whose secondary theme code was artistic had the highest average starting salary ($1997.50), while those whose secondary theme was conventional had the lowest ($1173.33). The small cell sizes in the Artistic, Conventional and Social theme groups may have affected this result.

Accounting Program

None of the Holland predictor variables showed significant effects to either of the criteria variables for the Accounting program. However, the sex of the student was found to have an effect on the number of days of employment obtained after graduation (F = 4.846). The mean number of employment days was 135.86 for women, and 105.23 for men. On the average, women in the Accounting program found employment one month sooner than did the men.

Architecture Program

Several significant findings were noted in the Architecture program. The enterprising (E) personality type received the highest mean salary ($1731.25), and the conventional (C) type the lowest ($1066.67). The analysis

of variance indicated that primary theme type has a significant effect on starting salary (F = 2.432).

A more difficult finding to explain was the relationship between tertiary personality type (THEM3) and days of employment (DEMP). Students whose THEM3 type was social worked an average of 159.40 days after graduation, whereas conventional THEM3 types worked only 71.50. The analysis of variance indicated that the tertiary theme type had a significant effect on days of employment (F = 2.674).

The third significant finding for the Architecture program was that level of consistency (CONS1) had an effect on days of employment (DEMP; F = 3.59). Contrary to what might be expected, the relationship was not linear; high CONS1 scores did not result in a greater number of days employed. The mean number of days employed for the low, moderate and high consistency groups were 78.00, 140.05 and 114.65, respectively.

The final result worthy of note for the Architecture program was that the males in the program received a higher mean starting wage than did the females ($1338.10 and $1120.05, respectively). The analysis of variance indicated that the sex of the student had a significant effect on their starting salary (F = 5.629).

Summary of Observations Pertaining to Question 3

Several significant relationships were found between Holland's basic constructs and the determinants of success

in the job search process. However, the constructs seemed to be differentially predictive; that is, none of Holland's constructs were equally effective for all programs. Furthermore, patterns noted when the sample was considered as one group were not repeated when the analysis was conducted for each of the program groups separately. Finally, while many statistically significant relationships were found, the strength of the relationships were typically weak.

Analysis of Question 4

The purpose of the fourth research question was to determine whether or not the prediction of job search success could be improved by forming linear combinations of the predictor variables. Specifically, the question that was addressed was:

Question 4: Does any combination of predictor variables significantly improve the prediction of job search success?

Regression analyses were conducted for the criteria variables of days of employment (DEMP) and salary (SAL). The regression results for the former are presented first.

Results from the Prediction of Days of Employment

Table 17 presents the summary of data pertaining to the regression equation for the prediction of days of employment (DEMP) for the whole sample. Two regression equations were calculated, the first using just the Holland predictors, and

the second using age and employment history in addition to the Holland predictors.

Three of the Holland predictors, entered in order of maximum contribution to the variance in the dependent variable, were used to derive the regression equation for days of employment. The three predictors were the investigative (I) theme score, differentiation (DIFF1) and identity (IDEN). This combination of predictor variables produced a multiple correlation of R = .2535. From these data, the following regression equation for the prediction of days of employment was drawn:

DEMP = 91.20 - 1.13 (I) + 1.23 (DIFF1) + 2.09 (IDEN)

The combination of predictors accounted for only 6.42% of the variance in days of employment. Each of the variables in the equation accounted for approximately two per cent of the variance.

When all predictors were included, only two variables were needed to derive the regression equation. After full time work experience (FT) and the Monahan method of assessing differentiation (DIFF2), no predictors were able to increase the known variance in days of employment sufficiently enough to be included in the regression equation. With the inclusion of FT and DIFF2, a multiple correlation of R = .2207 was achieved. The two predictors accounted for only 4.87% of the variance in DEMP.

The results of the regression analysis for days of employment by program are presented in Table 18.

For students in the Electronics program, a significant regression equation was produced, but it only contained one predictor variable: the realistic theme score (R). Thus, the multiple correlation obtained (R = .2443) is identical to the simple correlation obtained for the realistic theme. No combination of predictors was found to improve the prediction of success.

The regression equation for students in the Accounting program included two predictors: the investigative theme score (I), and differentiation (DIFF1). These two predictors produced a multiple correlation of R = .3570. From these data, the following regression equation for the prediction of days of employment for Accounting students was drawn:

DEMP = 119.155 - 1.99 (I) + 2.04 (DIFF1)

The inclusion of differentiation increased the percentage of variance in days of employment accounted for by 5.85% over simply using the investigative theme score, which accounted for 6.90% of the variance. The total of 12.74% of the variance in DEMP accounted for is still, at best, marginal.

No regression equation was obtained for students in the Architectural program. There were no significant correlations among the Holland predictors, and no

combination of predictors were able to improve the prediction.

Results from the Prediction of Salary

Table 19 presents the summary data pertaining to the regression equation for the prediction of salary for the whole sample.

When only Holland predictors were considered, four variables made significant contributions to the variance in salary: the realistic (R) theme code, differentiation (DIFF1), the investigative (I) theme code, and the enterprising (E) theme code. Together, these predictors produced a multiple correlation of R = .3413, and accounted for 11.65% of the variance in salary. The resulting regression equation is as follows:

SAL = 910.78 + 11.44 (R) + 13.57 (DIFF1)
- 11.57 (I) + 7.43 (E)

Thus when the whole sample was considered as a single group, a combination of predictors was found which could improve the prediction of salary over using single variables in isolation.

When all predictors were considered for possible inclusion in the regression equation, only one change occurred in the list of contributing predictors. The amount of full-time employment was the major contributor to the variance in salary, followed by the realistic (R) theme, differentiation (DIFF1), and the investigative (I) theme.

These predictors produced a multiple correlation of R = .3850, and accounted for 14.83% of the variance in salary.

Table 20 presents the summary data pertaining to the regression equation for the prediction of salary for each of the three program groups.

Three of the Holland predictors were used to derive the regression equation for the Electronics program, yielding a multiple correlation of R = .5781. Together, the conventional (C) theme, the realistic (R) theme, and consistency (CONS1) accounted for 33.42% of the variance in salary, and produced the following regression equation:

SAL = 1641.72 - 25.75 (C) + 26.89 (R) - 213.75 (CONS1)

For Electronics students, a combination of predictors significantly improved the prediction of salary.

Only one predictor variable was used in the regression equation for the Accounting students: the Strahan measure of consistency (CONS2). The simple correlation (r = .2405) was not improved upon with the addition of other predictor variables. Thus, for the Accounting students, no combination of predictors improved the prediction of salary.

Two predictor variables were entered into the regression equation for the Architecture group. The enterprising (E) and artistic (A) themes produced a multiple correlation of R = .4449, and accounted for 19.80% of the variance in salary. The resulting regression equation is as follows:

SAL = 1241.43 + 13.41 (E) - 11.38 (A)

Thus, for Architecture students, the combination of the enterprising and artistic themes as predictors improved on the prediction of salary over the use of any single predictor.

Analysis of Question 5

The final steps in the general search for relationships were to attempt to use the predictor variables to classify individuals according to their employment status and the relationship of their employment to their recent training. The question was posed as follows:

Question 5: Is it possible to use the Holland predictor variables to classify individuals into categories of success in the job search process?

The method of analysis utilized to attempt to assign individuals to groups based on employment status or relation to training was the discriminant function analysis. A summary of the efficacy of the classifications is presented in Table 21.

Whole Sample

Using the Holland predictors with the whole sample, 38.33% of the students were correctly classified into the three relation to training groups (directly related, indirectly related, unrelated). A modest improvement to 41.14% correct classifications occurred for the prediction

of employment status (full-time, part-time, and unemployed). The inclusion of the non-Holland predictors (i.e. number of months of full-time employment, number of months of part-time employment, and age) provided a minimal increase in classification efficiency, from 38.33 to 41.35% for relation to training, and a small decrease (from 41.14% to 39.43%) in classification efficiency for status.

Program by Program Analysis

The efficacy of the discriminant function analysis for the prediction of both relation to training and status using the Holland predictors improved when the whole sample was divided into the program subgroups. The discriminant function analysis for the Electronics (EET) program resulted in 57.45% correct classifications of relation to training groups, and 47.27% correct classifications of status groups. The Architecture (AT) program yielded similar, though higher, clssification results; 76.79% correct classifications were obtained for relation to training groups, and 53.95% correct classsifications for the status groups. For both the Electronics and Architecture programs, the Holland predictors were more efficient at classifying relation to training groups than status groups, but both discriminant classifications were more efficient than the whole sample classifications.

A somewhat different pattern emerged for the Accounting (ACC) program. Although the classification efficiency

improved over the whole sample classifications for both criteria (from 38.33% to 40.00% for relation to training, and from 41.14% to 52.21% for status), the improvement was only marginal in the case of relation to training. Thus, for the Accounting program, the Holland predictors were more efficient at classifying status then relation to training.

The significance of the discriminant function equations for each of the three programs is presented in Table 22. Each criteria was classified according to membership in one of three groups, resulting in two possible discriminant functions. Only the principle function is presented in Table 22; however, for purposes of comparison, the percentage of variance that the principle root accounted for is indicated. It is important to note that the variance being referred to is the variance in the criteria that the discriminant function accounts for, and not the total variance in the criteria.

There were no significant classifications when the sample was treated as a whole, and only one significant classification system when the analysis was conducted on the separate program groups. The discriminant function analysis using Holland predictors to classify individuals into one of the three categories of relation to training was significant, with a converted chi square of 37.53. The classification of relation to training groups was not significant for the Architecure program even though 76.79%

correct classifications were obtained. This was due to the low sample number in relation to the high degrees of freedom. This problem could be overcome by either increasing the sample size, or eliminating some of the predictors, thus reducing the actual degrees of freedom.

Table 7

Pearson Product-Moment Correlations: Whole Sample

PREDICTORS	CRITERIA					
	SAL			DEMP		
	r	n	Signif.	r	n	Signif.
R	.154	198	.015 *	-.086	202	.112
I	-.107	198	.066	-.150	202	.017 *
A	-.143	198	.022 *	-.063	202	.186
S	-.053	198	.230	.036	202	.304
E	.108	198	.065	-.024	202	.366
C	-.014	198	.424	.040	202	.286
DIFF1	.152	198	.016 *	.150	202	.017 *
DIFF2	.122	198	.043 *	.145	202	.020 *
CONS2	-.051	198	.236	-.036	202	.307
CONG	.069	198	.166	.026	202	.358
IDEN	.140	197	.025 *	.137	201	.027 *
FT	.278	196	.000 *	.167	200	.009 *
PT	-.170	196	.009 *	-.028	200	.349
AGE	.237	196	.000 *	.133	200	.030 *

* significant, at $p < .05$

Table 8

Pearson Product-Moment Correlations: Electronics Students

PREDICTORS	CRITERIA					
	SAL			DEMP		
	r	n	Signif.	r	n	Signif.
R	.219	71	.033*	.244	74	.018*
I	-.204	71	.044*	-.025	74	.415
A	.023	71	.425	-.109	74	.178
S	-.163	71	.087	.034	74	.386
E	-.083	71	.245	.060	74	.307
C	-.389	71	.000*	-.038	74	.375
DIFF1	.301	71	.005*	.173	74	.070
DIFF2	.265	71	.013*	.141	74	.116
CONS2	-.217	71	.034*	.021	74	.431
CONG	.171	71	.077	.092	74	.218
IDEN	.096	71	.212	.020	74	.432
FT	.202	71	.046*	.075	74	.262
PT	-.280	71	.009*	.152	74	.098
AGE	.057	71	.319	.016	74	.445

* significant, at $p < .05$

Table 9

Pearson Product-Moment Correlations: Accounting Students

PREDICTORS	CRITERIA					
	SAL			DEMP		
	r	n	Signif.	r	n	Signif.
R	.216	76	.031 *	-.239	73	.021 *
I	-.127	76	.137	-.263	73	.012 *
A	.047	76	.344	-.172	73	.072
S	.000	76	.499	.050	73	.337
E	.224	76	.026 *	-.131	73	.135
C	.055	76	.319	-.011	73	.464
DIFF1	.028	76	.406	.249	73	.017 *
DIFF2	.023	76	.421	.233	73	.024 *
CONS2	.241	76	.018 *	-.028	73	.407
CONG	-.026	76	.412	-.005	73	.483
IDEN	.207	76	.036 *	.216	73	.033 *
FT	.275	76	.008 *	.297	73	.005 *
PT	-.044	76	.353	-.153	73	.099
AGE	.350	74	.001 *	.271	71	.011 *

* significant, at $p < .05$

Table 10

Pearson Product-Moment Correlations: Architecture Students

PREDICTORS	CRITERIA					
	SAL			DEMP		
	r	n	Signif.	r	n	Signif.
R	.135	51	.172	.070	55	.305
I	-.182	51	.101	-.022	55	.437
A	-.277	51	.025 *	-.053	55	.349
S	-.008	51	.478	-.110	55	.213
E	.309	51	.014 *	-.115	55	.203
C	.235	51	.049 *	-.154	55	.131
DIFF1	-.069	51	.314	-.012	55	.465
DIFF2	.049	51	.368	-.021	55	.438
CONS2	-.272	51	.027	-.005	55	.485
CONG	-.217	51	.063	.025	55	.429
IDEN	.085	50	.279	.142	54	.152
FT	.401	49	.002 *	.258	53	.031 *
PT	-.232	49	.054	-.134	53	.169
AGE	.248	51	.040 *	.240	53	.039 *

* significant, at $p < .05$

TABLE 11A

CHI SQUARE ANALYSIS: NOMINAL PREDICTORS AND CRITERIA
WHOLE SAMPLE

	STAT			RELT		
	χ^2	df	SIGNIF.	χ^2	df	SIGNIF.
Predictors						
THEM1	9.92	10	0.45	5.73	10	0.84
THEM2	7.52	10	0.68	9.73	10	0.46
THEM3	4.23	10	0.94	15.21	10	0.12
CONS1	3.11	4	0.54	3.31	4	0.51
SEX	5.42	2	0.07	0.35	2	0.84
ESL	8.05	2	0.02 *	0.76	2	0.68
	n = 300				n = 241	

* - significant with $p < .05$

TABLE 11B

CHI SQUARE TABLE: ESL BY STAT (WHOLE SAMPLE)

		STAT 1	2	3	Total
ESL 0	o	191	30	37	258
	e	187.5	27.5	43.0	
1	o	27	2	13	42
	e	30.5	4.5	7.0	
Total		218	32	50	300

$\chi^2 = 8.05$ df = 2 p = 0.02

ESL: 0 = students with English as first language
1 = students with English as a second language
STAT: 1 = employed full time
2 = employed part time
3 = unemployed

o - observed
e - expected

TABLE 12A

CHI SQUARE ANALYSIS: NOMINAL PREDICTORS AND CRITERIA

	STAT χ^2	STAT df	STAT SIGNIF.	RELT χ^2	RELT df	RELT SIGNIF.
Electronics						
THEM1	6.48	8	0.59	9.40	8	0.31
THEM2	5.50	10	0.85	7.27	10	0.70
THEM3	5.09	10	0.89	9.62	10	0.47
CONS1	2.69	4	0.61	3.68	4	0.45
SEX	1.63	2	0.44	2.97	2	0.23
ESL	1.95	2	0.38	0.79	2	0.67
	(n = 110)			(n = 94)		
Accounting						
THEM1	4.71	8	0.79	2.88	8	0.94
THEM2	9.68	10	0.47	5.20	10	0.88
THEM3	7.59	10	0.67	6.80	10	0.74
CONS1	4.50	4	0.34	2.95	4	0.57
SEX	2.36	2	0.31	1.43	2	0.49
ESL	2.44	2	0.29	0.88	2	0.64
	(n = 113)			(n = 90)		
Architecture						
THEM1	6.24	10	0.80	18.99	10	0.04 *
THME2	3.79	10	0.96	17.48	10	0.06
THEM3	8.17	10	0.61	13.31	10	0.21
CONS1	0.18	4	0.99	4.59	4	0.33
SEX	2.27	2	0.32	1.81	2	0.40
ESL	9.28	2	0.01 *	0.40	2	0.82
	(n = 77)			(n = 57)		

* significant with $p < .05$

Table 12B

Chi Square Tables: Significant Results with Nominal Predictors

THEM1 by Relation to Training (RELT): Architecture (AT)

THEM1		RELT 1	2	3	Total
R	o	15	1	0	16
	e	11.5	2.8	1.7	
I	o	7	0	2	9
	e	6.5	1.6	0.9	
A	o	13	6	1	20
	e	14.4	3.5	2.1	
S	o	3	0	1	4
	e	2.9	0.7	0.4	
E	o	3	1	1	5
	e	3.6	0.9	0.5	
C	o	0	2	1	3
	e	2.2	0.5	0.3	
Total		41	10	6	57

$\chi^2 = 18.9926$ df = 10 p = .0404

RELT: 1 = employment directly related to training
2 = employment indirectly related to training
3 = employment unrelated to training
o - observed frequency
e - expected frequency

Table 12C

Chi Square Results: Significant Results with Nominal Predictors

English as a Second Language (ESL) by Status (STAT): Architecture

			STAT 1	2	3	Total
ESL	0	o	55	9	8	72
		e	53.3	8.4	10.3	
	1	o	2	0	3	5
		e	3.7	0.6	0.7	
	Total		57	9	11	77

$\chi^2 = 9.2835$ df = 2 p = .0096

ESL: 0 = English as first language
1 = English as a second language
STAT: 1 = full-time employment
2 = part-time employment
3 = unemployed

o - observed frequency
e - expected frequency

TABLE 13A

CHI SQUARE ANALYSIS: Interval-level Predictor Variables Recoded About the Median

Electronics (EET) Students

Predictors	STAT χ^2	STAT df	STAT SIGNIF.	RELT χ^2	RELT df	RELT SIGNIF.	
R	0.33	2	0.85	2.23	2	0.33	
I	1.89	2	0.39	1.89	2	0.39	
A	3.89	2	0.14	1.18	2	0.55	
S	4.22	2	0.12	2.96	2	0.23	
E	2.81	2	0.25	1.04	2	0.59	
C	0.39	2	0.82	8.11	2	0.02	*
DIFF1	2.91	2	0.23	1.90	2	0.39	
DIFF2	2.35	2	0.31	9.26	2	0.01	*
CONS2	0.84	2	0.66	0.50	2	0.78	
CONG	2.54	2	0.28	1.47	2	0.48	
IDEN	0.26	2	0.88	5.13	2	0.08	
FT	2.60	2	0.27	0.95	2	0.62	
PT	2.84	2	0.24	0.00	2	1.00	
AGE	3.93	2	0.14	0.69	2	0.71	
	(n = 110)				(n = 94)		

* significant, with $p < .05$

Table 13B

Chi Square Tables: Significant Results with Interval-level Predictors
Electronics (EET) Students

1. Conventional Theme (C) by Relation to Training (RELT)

			RELT 1	2	3	Total
C	1	o	35	10	4	49
		e	30.2	9.4	9.4	
	2	o	23	8	14	45
		e	27.8	8.6	8.6	
	Total		58	18	18	94

χ^2 = 8.1050 df = 2 p = .0174

2. Differentiation (DIFF2) by Relation to Training (RELT)

			RELT 1	2	3	Total
DIFF2	1	o	25	14	13	52
		e	32.1	10.0	10.0	
	2	o	33	4	5	42
		e	25.9	8.0	8.0	
	Total		58	18	18	94

χ^2 = 9.2555 df = 2 p = .0098

Predictor Variables (C & DIFF2): 1 = below median
2 = above median
Criteria Variable (RELT): 1 = directly related to training
2 = indirectly related to training
3 = unrelated to training

o - observed frequency
e - expected frequency

TABLE 14

Chi Square Analysis: Interval-level Predictor Variables Recoded About the Median

Accounting (ACC) Students

Predictors	STAT χ^2	STAT df	STAT SIGNIF.	RELT χ^2	RELT df	RELT SIGNIF.
R	3.20	2	0.20	0.10	2	0.95
I	3.89	2	0.14	0.03	2	0.98
A	0.18	2	0.91	1.20	2	0.55
S	1.27	2	0.53	0.27	2	0.87
E	1.74	2	0.42	0.71	2	0.70
C	1.08	2	0.58	0.17	2	0.92
DIFF1	0.58	2	0.75	1.11	2	0.57
DIFF2	0.75	2	0.69	0.21	2	0.90
CONS2	4.88	2	0.09	1.19	2	0.55
CONG	1.88	2	0.39	0.41	2	0.81
IDEN	2.82	2	0.24	0.83	2	0.66
FT	2.90	2	0.23	0.59	2	0.77
AGE	1.79	2	0.41	2.42	2	0.30
	(n = 113)			(n = 90)		

no significant relationships found

TABLE 15A

Chi Square Analysis: Interval-level Predictor Variables Recoded About the Median

ARCHITECTURE (AT) Students

Predictors	STAT χ^2	STAT df	STAT SIGNIF.	RELT χ^2	RELT df	RELT SIGNIF.
R	3.44	2	0.18	4.90	2	0.89
I	3.50	2	0.17	2.14	2	0.34
A	1.82	2	0.40	2.73	2	0.26
S	0.48	2	0.79	1.20	2	0.55
E	2.68	2	0.26	0.67	2	0.71
C	6.38	2	0.04 *	3.29	2	0.20
DIFF1	1.36	2	0.51	0.66	2	0.72
DIFF2	0.43	2	0.81	1.54	2	0.46
CONS2	0.10	2	0.95	3.45	2	0.18
CONG	0.23	2	0.89	1.25	2	0.54
IDEN	0.10	2	0.95	0.67	2	0.71
FT	0.21	2	0.90	4.27	2	0.12
PT	2.43	2	0.30	2.11	2	0.65
AGE	6.15	2	0.05 *	0.85	2	0.65
	(n = 77)			(n = 57)		

* significant, $p < .05$

Table 15B

Chi Square Tables: Significant Results with Interval-level Predictors
Architecture (AT) Students

1. Conventional Theme (C) by Status (STAT)

			STAT 1	2	3	Total
C	1	o	25	8	6	39
		e	28.9	4.6	5.6	
	2	o	32	1	5	38
		e	28.1	4.4	5.4	
	Total		57	9	11	77

$\chi^2 = 6.38$ df = 2 p = 0.0411

---

2. Age (AGE) by Status (STAT)

			STAT 1	2	3	Total
AGE	1	o	38	6	3	47
		e	34.8	5.5	6.7	
	2	o	19	3	8	30
		e	22.2	3.5	4.3	
	Total		57	9	11	77

$\chi^2 = 6.15$ df = 2 p = 0.0461

Predictor Variables (C & AGE): 1 = below median
2 = above median
Criteria Variable (STAT): 1 = employed full-time
2 = employed part-time
3 = unemployed

o - observed
e - expected

Table 16A

ANOVA Results for Nominal Predictors and Interval Criteria

PREDICTORS	DEMP		SAL	
	F	SIGNIF.	F	SIGNIF.
I. Whole Sample (N=188)				
THEM1	0.654	0.659	2.462	0.035 *
THEM2	1.325	0.256	1.814	0.112
THEM3	0.504	0.773	1.517	0.186
CONS1	2.009	0.137	0.200	0.189
SEX	2.729	0.100	5.461	0.021 *
ESL	0.618	0.433	0.334	0.564
II. ELECTRONICS (n=70)				
THEM1	2.190	0.080	0.948	0.442
THEM2	0.319	0.900	2.639	0.031 *
THEM3	0.893	0.491	1.235	0.303
CONS1	0.290	0.749	2.042	0.138
SEX	0.394	0.532	0.810	0.371
ESL	0.363	0.549	0.229	0.634
III. ACCOUNTING (n=67)				
THEM1	0.615	0.654	1.272	0.291
THEM2	1.346	0.257	2.116	0.076
THEM3	0.780	0.568	0.462	0.803
CONS1	0.045	0.956	1.745	0.183
SEX	4.846	0.031 *	0.050	0.809
ESL	0.002	0.966	0.946	0.334
IV. ARCHITECTURE (n=51)				
THEM1	0.786	0.565	2.431	0.049 *
THEM2	0.973	0.445	0.978	0.441
THEM3	2.674	0.034 *	0.718	0.613
CONS1	3.590	0.035 *	0.877	0.422
SEX	2.541	0.117	5.629	0.022 *
ESL	0.382	0.539	0.335	0.566

* - denotes significance with $p < .05$

Table 16B

Significant ANOVA Results: Whole Sample

---

1. THEM1 by SAL

Codes	R	I	A	S	E	C
Salary	1518.60	1367.67	1175.35	1247.31	1482.14	1364.56
(n)	50	42	17	13	14	52

F = 2.462 df = 5 n = 188 p < .035

---

2. SEX by SAL

SEX	Male	Female
Salary	1438.30	1288.70
(n)	127	61

F = 5.461 df = 1 n = 188 p < .021

Table 16C

Significant ANOVA Results, by Program

1. THEM2 by Salary, Electronics Program

Codes	R	I	A	S	E	C
SAL	1437.56	1366.90	1997.50	1422.17	1729.55	1173.33
(n)	25	21	4	6	11	3

F = 2.639 df = 5 n = 70 p < .031

2. SEX by Days of Employment, Accounting Program

Sex	Male	Female
DEMP	105.23	135.86
(n)	30	37

F = 4.846 df = 1 n = 67 p < .031

3. THEM1 by Salary, Architecture Program

Codes	R	I	A	S	E	C
SAL	1289.33	1160.00	1175.35	1180.00	1731.25	1066.67
(n)	15	8	17	4	4	3

F = 2.431 df = 5 n = 51 p < .049

4. THEM3 by Days of Employment, Architecture Program

Codes	R	I	A	S	E	C
DEMP	138.43	121.69	97.00	159.40	100.42	71.50
(n)	7	13	7	10	12	2

F = 2.674 df = 5 n = 51 p < .034

5. CONS1 by Days of Employment, Architecture Program

Consistency	Low	Moderate	High
DEMP	78.00	140.05	114.65
(n)	5	20	26

F = 3.590 df = 2 n = 51 p < .035

6. SEX by Salary, Architecture Program

Sex	Male	Female
Salary	1338.10	1120.05
(n)	29	22

F = 5.629 df = 1 n = 51 p < .022

Table 17

Regression Summary Table for the Prediction of Days of Employment: Whole Sample

1. Holland Predictors Only

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
I	.1500	.0225	.0225	-.1500	-1.13
DIFF1	.2128	.0453	.0228	.1498	1.23
IDEN	.2535	.0642	.0189	.1365	2.09

constant = 91.20
F = 4.508
p < .004

---

2. All Predictors

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
FT	.1668	.0278	.0278	.1668	0.22
DIFF2	.2207	.0487	.0209	.1451	1.72

constant = 95.88
F = 5.043
p < .007

Table 18

Regression Summary Table for the Prediction of Days of Employment, By Group: Holland Predictors Only

1. Electronics Program

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
R	.2443	.0597	.0597	.2443	2.14

constant = 32.72
F = 4.571
p < .036

---

2. Accounting Program

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
I	.2626	.0690	.0690	-.2626	-1.99
DIFF1	.3570	.1274	.0585	.2486	2.04

constant = 119.155
F = 5.111
p < .008

---

3. Architecture Program

No variables satisfied minimum tolerance; therefore, no equation was obtained for the prediction of DEMP for Architecture students.

Table 19

Regression Summary Table for the Prediction of Salary: Whole Sample

1. Holland Predictors Only

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
R	.1540	.0237	.0237	.1540	11.44
DIFF1	.2415	.0583	.0346	.1518	13.57
I	.3053	.0932	.0349	-.1074	-11.57
E	.3413	.1165	.0232	.1078	7.43

constant = 910.78
F = 6.327
p < .001

---

2. All Predictors

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
FT	.2780	.0773	.0773	.2780	2.31
R	.3114	.0970	.0197	.1540	9.89
DIFF1	.3550	.1263	.0293	.1520	11.36
I	.3850	.1483	.0219	-.1070	-8.43

constant = 1022.94
F = 8.315
p < .001

Table 20

Regression Summary Table for the Prediction of Salary, by Group: Holland Predictors Only

1. Electronics Program

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
C	.3894	.1516	.1516	-.3894	-25.75
R	.4945	.2445	.0929	.2188	26.89
CONS1	.5781	.3342	.0897	-.1816	-213.75

constant = 1641.72
F = 11.21
p < .001

---

2. Accounting Program

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
CONS2	.2405	.0578	.0578	.2405	39.28

constant = 1183.69
F = 4.54
p < .036

---

3. Architecture Program

Predictor Variable	Multiple-R	R-Square	RSQ Change	Simple-R	B
E	.3088	.0954	.0954	.3088	13.41
A	.4449	.1980	.1026	-.2771	-11.38

constant = 1241.43
F = 5.80
p < .006

Table 21

Discriminant Function Analysis Summary Table

Percentage of Correct Classifications

	Relation to Training	Status
1. Whole Sample		
Holland Predictors*	38.33%	41.14%
All Predictors**	41.35%	39.43%
2. Electronics Program		
Holland Predictors	57.45%	47.27%
All Predictors	63.83%	50.93%
3. Accounting Program		
Holland Predictors	40.00%	52.21%
All Predictors	46.59%	57.66%
4. Architecture Program		
Holland Predictors	76.79%	53.95%
All Predictors	76.36%	64.86%

---

* Holland Predictors: R, I, A, S, E, C, DIFF1, DIFF2, CONS1, CONS2, CONG, and IDEN

** All Predictors: Holland predictors, plus FT, PT, and AGE

Table 22

Discriminant Function Analysis Summary Table:
Principle Components for Relation to Training and Status

A. Relation to Training

Predictors	Eigen-Value	% Variance	Canon. Corre.	Wilks Lambda	Chi Sq.	DF	p
1. Whole Sample (n = 237)							
Holland	0.1009	84.74	.3027	.8922	26.07	24	.3496
All	0.1054	81.64	.3088	.8837	28.07	30	.5665
2. EET (n = 94)							
Holland	0.4625	88.41	.5623	.6447	37.53	24	.0387
All	0.6555	87.54	.6239	.5525	49.84	30	.0129
3. ACC (n = 88)							
Holland	0.1205	66.13	.3279	.8406	13.81	24	.9508
All	0.4260	63.21	.3533	.8081	16.62	30	.9769
4. AT (n = 55)							
Holland	0.6910	73.46	.6392	.4733	34.79	24	.0716
All	0.7294	72.63	.6494	.4535	35.58	30	.2210

B. Status

Predictors	Eigen-Value	% Variance	Canon. Corre.	Wilks Lambda	Chi Sq.	DF	p
1. Whole Sample (n = 293)							
Holland	0.0607	68.01	.2392	.9166	24.77	24	.4185
All	0.0950	72.20	.2946	.8810	35.87	30	.2125
2. EET (n = 108)							
Holland	0.1012	69.23	.3032	.8690	13.97	24	.9473
All	0.2684	83.45	.4600	.7485	28.39	30	.5500
3. ACC (n = 111)							
Holland	0.1683	62.96	.3796	.7788	25.63	24	.3723
All	0.2073	65.80	.4143	.7478	29.36	30	.4990
4. AT (n = 74)							
Holland	0.2811	81.53	.4684	.7339	20.27	24	.6816
All	0.3057	58.24	.4838	.6283	29.74	30	.4789

Holland Predictors: R, I, A, S, E, C, DIFF1, DIFF2, CONS1, CONS2, CONG, and IDEN
All Predictors: Holland predictors, plus FT, PT, and AGE

CHAPTER VI

RESULTS OF THE ANALYSIS OF HOLLAND'S PREDICTIONS

Four specific questions, supplementary to the major focus of research, were asked. The first three of these questions deal with specific propositions made by Holland (1985), with respect to various combinations of his theoretical constructs as they pertain to coping with unemployment or job changes. The final question was posed as an additional check of the overall efficacy of Holland's theory in the prediction of job search success. The results of these analyses are presented below.

Question 6: For individuals in an incongruent environment, are those who are more highly differentiated and of greater consistency more successful in coping with unemployment and/or job change?

Students were defined as having "low" congruence if their congruence score was less than 13, which is the value from Iachan's (1984) Index given to an individual code whose three themes match, but are in reversed order to, the occupational code. Four categories of consistency-differentiation combinations were used: low consistency and low differentiation; low consistency and high differentiation; high consistency and low differention; and high consistency and high differentiation.

Chi square analyses, comparing the composite variable (CD) representing the four possible levels of consistency and differentiation with both employment status and relation of employment to training, were conducted for each group. These data are presented in Table 23. No significant relationships were found; therefore, the level of consistency and differentiation had no impact on either the employment status, or the relation to training of low congruence individuals.

Analysis of variance procedures were used to compare the levels of consistency-differentiation with the criteria variables of days of employment and salary. These data are presented in Table 24. No significant relationships were found; therefore, the level of consistency and differentiation had no impact on either the number of days of employment obtained by low congruence students, or on the average starting salary for those who found employment.

The results of the chi square analyses and the analyses of variance indicate that there is no reason to suspect that coping with unemployment or job change for incongruent individuals is related to their levels of consistency and differentiation. This finding must be tempered by the fact that very few students fit the "incongruent" category; the small sample sizes may have had a negative effect on the results.

Question 7: Is effective coping with unemployment and/or job change positively associated with high consistency and identity scores?

The analysis for Question 7 followed the same general procedures as outlined for the analysis of Question 6, with the exception of the low congruence requirement: all individuals, regardless of congruence score, were included in the analysis. A composite variable (CI) representing the four possible combinations of consistency and identity was established. The four levels of CI were: low consistency/low identity; low consistency/high identity; high consistency/low identity; and high consistency/high identity.

The results of the chi sqaure analysis comparing levels of consistency and identity to employment status and relation to training are presented in Table 25. No significant relationships were found, indicating that status and relation to training are independent of levels of consistency and identity.

The results of the analysis of variance comparing levels of consistency and identity to days of employment and salary are presented in Table 26. Once again, no significant relationships were found. Levels of consistency and identity have no effect on the number of days of

employment, nor on the average starting salary of the students in the three programs studied.

The chi square analyses and analyses of variance suggest that coping with unemployment and/or job change is unrelated to levels of consistency and identity.

Question 8: Does effective coping with unemployment and/or job change follow the predicted Holland sequence of S-E-A-R-I-C?

The data from previous analyses were reviewed to provide an answer to Question 8. First, the correlations between the theme scores and the criteria variables of salary and days of employment were examined. These data were initially presented in Tables 7 to 10. The correlation coefficients were ranked according to size, and compared to the predicted pattern. The rankings are provided in Table 27. In no instances did the observed pattern follow the predicted pattern. The prominence of the Social theme in the predicted sequence was only duplicated for the accounting students in comparsion to the days of employment they obtained after graduation. It should be noted that ranking the correlations in this manner is highly speculative; most of the coefficients were not significant, and thus the rankings observed may be a product of chance variations in the sample. When only significant correlations are considered, the realistic (R) and

enterprising (E) themes are the most prominent predictors of salary; the investigative (I) theme seems to be negatively correlated with days of employment. The only summative generalization that can be drawn from these data is that the order of theme effectiveness varies from program to program.

The chi square results initially presented in Tables 11A to 15B were reviewed for an indication of the importance of the primary theme types (THEM1) to the employment status and relation of the employment to training. The primary theme made a difference to the relation to training for the Architecture (AT) students, with more realistic (R) and fewer artistic (A), enterprising (E) and conventional (C) individuals finding employment directly related to their training. Once again, the dominance of the realistic theme goes against the predicted priority of the social theme. In all other programs, the primary theme had no effect on status or relation to training.

Chi squares were also reviewed to compare the theme scores, recoded into "Low" and "High" groups about the median, to employment status and relation to training. For the Electronics students, a low conventional theme score was associated with training related employment more frequently than expected, but no significant relationships were found for the social theme. A high conventional score was positively associated with full-time employment for

Architecture students. Once again, these findings contradict the predicted sequence of themes.

The final method of comparison was to consider the analysis of variance results, presented in Tables 16A to 16C. The theme codes (THEM1, THEM2 and THEM3) were compared to starting salary and days of employment. Limited support for the predicted sequence was found in the comparison of the effects of the third theme type (THEM3) and days of employment for Architecture students. The mean number of days employed after graduation, by the third theme type, followed the sequence S - R - I - E - A - C.

The primary theme type had a significant effect on the starting salary of Architecture students; the themes, ranked in order of highest to lowest mean starting salary, were E - R - S - A - I - C. This order is consistent with the description of the enterprising personality type; however, the pattern was not repeated for the other programs.

None of the various methods of comparison described provided confirmation of the predicted ranking of the efficacy of the different theme types in coping with job change or unemployment with the sample of students used in this study. Furthermore, each program, and each criteria within each program, generated different ranking patterns. Therefore, no generalizations with respect to coping efficacy by theme type could be drawn.

Question 9: For individuals who found employment directly related to their training, did their primary theme code have any effect on the length of time it took to find the employment?

Only those students who found employment that was directly related to their training were considered for analysis. Each student was assigned to one of three groups, based on the similarity of the primary theme of their vocational code to that of the program environment code. The groups were defined as being similar, moderately similar, or dissimilar. An analysis of variance, comparing the mean number of employment days obtained for each of the three groups, was conducted for each of the three programs in the study. The results of these analyses are presented in Table 28.

No significant differences were found between the mean number of employment days for each of the three levels of similarity, on any of the three program analyses. Those students whose primary theme code was opposite to the primary theme for their program environment were able to secure employment in their field just as quickly as those whose codes matched. Thus, the relationship of the primary theme code to the program environment code had no significant effect on the length of time it took individuals to find training-related employment.

As a final check, the analysis of variance procedures were conducted with salary (SAL) as the criterion. Once again, no significant differences were found. Therefore, the relationship of the primary theme code to the program environment code had no significant effect on the starting salary of those who found employment in their field of training.

Table 23

Chi Square Analysis for Low Congruence Students: Status and Relation to Training by Consistency/Differentiation

	STAT				RELT			
	χ^2	DF	N	SIG.	χ^2	DF	N	SIG.
1. Electronics	4.68	6	15	.59	4.68	6	11	.59
2. Accounting	6.73	4	17	.29	3.67	4	15	.45
3. Architecture	0.50	4	27	.97	0.62	4	20	.96

No significant relationships

Table 24

ANOVA Results For Low Congruence Students: Salary and Days of Employment By Consistency/Differentiation

	DEMP		SAL	
	F	SIGNIF.	F	SIGNIF.
1. Electronics (n = 11)	0.167	0.915	0.598	0.637
2. Accounting (n = 14)	0.748	0.496	3.410	0.070
3. Architecture (n = 17)	0.436	0.655	0.822	0.460

No significant relationships

Table 25

Chi Square Analysis Summary Table:
Status and Relation to Training by Consistency/Identity

	STAT				RELT			
	χ^2	DF	N	SIG.	χ^2	DF	N	SIG.
1. Electronics	3.69	6	109	.72	11.74	6	93	.07
2. Accounting	0.18	4	91	.99	0.68	4	78	.95
3. Architecture	0.34	6	77	.99	9.72	6	57	.14

No significant relationships

Table 26

ANOVA Summary Table:
Days of Employment and Salary By Consistency/Identity

	DEMP		SAL	
	F	SIGNIF.	F	SIGNIF.
1. Electronics (n = 69)	1.036	0.383	1.303	0.281
2. Accounting (n = 67)	1.505	0.230	3.005	0.057
3. Architecture (n = 51)	0.861	0.468	0.781	0.510

No significant relationships

Table 27

Ranking of Theme Scores by Size of Correlation: Salary and Days of Employment

	SAL	DEMP
Whole Sample	R-E-C-S-I-A	C-S-E-A-R-I
Electronics	R-A-E-S-I-C	R-E-S-I-C-A
Accounting	E-R-C-A-S-I	S-C-E-A-R-I
Architecture	E-C-R-S-I-A	R-I-A-S-E-C

Table 28

ANOVA Summary Table:Days of Employment and Salary By Similarity of Primary Theme Code

	DEMP		SAL	
	F	SIG.	F	SIG.
1. Electronics (n = 39)	0.112	0.74	0.907	0.347
2. Accounting (n = 53)	0.266	0.767	1.932	0.155
3. Architecture (n = 35)	1.262	0.297	1.282	0.291

No significant relationships found.

CHAPTER VII

DISCUSSION OF THE ENVIRONMENTAL ASSESSMENT RESULTS

Holland's (1985) theory of vocational personalities and corresponding work environments is one of the most extensively applied theories in the practice of career counselling. His structural account of the relationships between personality factors and vocational development has provided the framework for counsellors to assist individuals in the career decision-making process. Although the theory provides an adequate framework for such assistance, it is relatively silent about the transition process from decision-making and preparation to the actual world of work.

The general purpose of this study was to determine whether or not specific links could be made between the various aspects of Holland's (1985) theory and the ability of individuals to successfully cope with the job search process. Three technical institute training programs were chosen to provide the subjects for the study; all subjects were in the last year of their program, and were thus preparing to re-enter the labour market after a minimum of two years absence. The initial sample size was 352; 300 students actually graduated, and formed the basis for the subsequent analysis.

"Success" in the job search process was defined by four distinct criteria. First, each individual's employment

status six months after graduation was determined. Second, for those that were employed during that period, the total number of days employed was calculated. Third, the relationship of the employment to the individual's training program was ascertained. Finally, the students who obtained employment were asked to disclose their starting salary.

The discussion of the results of the study are presented in three chapters, parallel to the presentation of the results of the analysis of the data. In this chapter, a discussion of the results of the environmental assessment is presented. This will be followed by a general discussion of the results of the primary research questions in Chapter VIII. In Chapter IX, the results of the analysis of Holland's specific predictions are presented.

Discussion of Question 1

The first task of the study, as posed in Research Question 1, was to determine the environmental codes for each of the three programs. The subsequent analysis produced codes of R-I-E for the Electronics program, C-E-I for the Accounting program, and A-R-I for the Architecture program. Thus, each of the three programs was represented by a unique occupational code. The students within each program shared certain characteristics of vocational personality which distinguished them from other groups.

The typical Electronics Engineering Technology student could be characterized by a dominance of Realistic and

Investigative themes in his or her vocational personality. The Realistic component of this combination is reflected in a preference for hands-on activities "that entail the explicit, ordered, or systematic manipulation of objects, tools, machines ... and to an aversion to educational or therapeutic activities" (Holland, 1985. p. 19). Holland described the Investigative personality as one whose preferences are for "activities that entail the observational, symbolic, systematic and creative investigation of ... phenomena in order to understand and control such phenomena, and to an aversion to persuasive, social and repetitive activities" (p.19-20). Although the Realistic theme was the primary theme for the Electronics students in this study, the Investigative theme carried nearly as much weight. Thus, each descriptor is equally valid in describing the Electronics student, but neither of them is sufficient to capture the Electronics personality.

According to Holland's (1985) theory, the environmental code yields valuable information for individuals considering entering that environment. The R-I-E code obtained for the Electronics program suggests that individuals who prefer working with and/or manipulating physical objects and have a nearly equal interest in investigating the principles governing the operation of those objects would have interests appropriate to the electronics environment. An

interest in business activities and/or sales and techniques of persuasion is also valuable, although to a lesser extent.

The R-I combination is highly consistent according to Holland's hexagonal model; that is, the salient characteristics of each of the two themes are compatible. This implies that the activities and interests inherent in the Electronics environment do not place many conflicting demands on the individual.

The environmental code obtained for the Accounting program was C-E-I, with the Conventional theme clearly dominant. Holland (1985) described the Conventional type as preferring "activities that entail the explicit, ordered, systematic manipulation of data ... to attain organizational or economic goals; and to an aversion to ambiguous, free, exploratory, or unsystematized activities" (p. 22). The Accounting environment in this study was dominated by a preference for order, and for the manipulation of data. To be congruent with the Accounting environment, an individual would need to augment the preference for order with interests in business activities and the manipulation of others as a means of attaining corporate goals (i.e., the Enterprising personality). In addition, the Accounting environment requires some interest in systematic investigation, as typified by the Investigative personality.

The primary and secondary themes of the Accounting environment code are highly consistent according to

Holland's (1985) hexagonal model. However, the secondary and tertiary themes are inconsistent (E-I), which implies that the Accounting environment may have features which are contradictory to each other. For example, the Enterprising personality typically avoids systematic observation and symbolic manipulation, which are dominant characteristics of the Investigative personality. It is generally more difficult for individuals to cope in environments which place such contradictory demands on them; however, these contradictions would appear to play a relatively minor role in the Accounting environment, due to the overwhelming doinance of the Conventional theme, and the consistency between the Conventional and Enterprising themes.

An environmental code of A-R-I was obtained for the Architectural Technology program. Holland (1985) described the Artistic individual as preferring "ambiguous, free, unsystematized activities....to create art forms or products, and to an aversion to explicit, systematic, and ordered activities" (p. 20). For typical Architecture students, the desire for an unstructured, creative environment is balanced by Realistic qualities of preferring hands-on activities, and by an interest in observation and systematic investigation, as characterized by the Investigative theme.

The A-R code is only moderately consistent, suggesting that there may be elements of the environment that place

contradictory demands on individuals. For example, the dominant Artistic theme, which is representative of a need for freedom of expression and lack of structure, is coupled with Realistic characteristics, which often include preference for order and physical manipulation of objects. Students in Architectural Technology may experience ambiguity and/or difficulty in deciding on and committing to a particular occupational goal.

Discussion of Question 2

The second research question compared obtained environmental codes to the codes predicted in the Occupations Finder (Holland, 1986). From these data, three further observations arising from the environmental assessment can be made. First, for each program, the occupational code that was derived from the study was different from that predicted in The Occupations Finder for the Self-Directed Search (Holland, 1986). This finding, which essentially supported Madill's (1985) finding for occupational therapists, has important implications for counselling. The counselling strategy using the Holland model is essentially one of matching individual personality characteristics with the characteristics of work environments; however, if the codes for the work environments are not accurate, then inappropriate "matches" will be made. Individuals may be directed towards

considering occupations that may not best reflect their occupational personalities.

The problem of inappropriate matches is heightened by the fact that, in popular usage, the Self-Directed Search is given with minimal counsellor interpretation and intervention. Without the counsellor to give clarity to the results, it would be easy for the individual to pursue inappropriate career alternatives based on their tested results and corresponding occupational codes. The conclusion to be drawn from this finding is that specific occupations must be subjected to an environmental assessment before linkages are made to individual test scores. For counsellors in educational institutes, this implies conducting environmental assessments of the programs at their institutes, in order to get a better indication of the programs' suitability for potential students.

The second general observation is linked to the first; discrepancies between assessed and predicted occupational codes suggest a need for exploration activities into occupations whose code is similar to, but different from, the code obtained by the individual. In the Manual for The Self-Directed Search (Holland, 1979), Holland stresses the need to use the obtained individual code as a guide for the exploration of suitable occupations; clients should be directed to consider various combinations of their personal code. While this is hardly a startling observation, it

needs to be reinforced as an important facet of translating the theory into actual practice.

The third general observation to be made with respect to the determination of environmental codes is the need to consider the relative weights of each of the three themes in the code. For example, the code that was determined for the Electronics program was RIE. Both of the Realistic and Investigative themes were heavily, and nearly equally, weighted, whereas the Enterprising theme was a distant third. This would imply that the electronics environment requires high Realistic and Investigative scores, with the third theme playing only a minor role. On the other hand, the Accounting environment code had a very high weighted score in the first position (Conventional), followed by a distant clustering of two minor themes (Enterprising and Investigative). This would suggest that an individual considering the accounting field must first and foremost have strong Conventional interests; other interests are secondary, and may help to define the type of accounting functions best suited to the individual. The pattern for the Architecture program was different from either of the Electronics or Accounting programs. In this case, the differences in the weights between the three theme scores was roughly equal, with no clustering of themes at either the high or low end.

There are distinct counselling implications of considering the relative weight of each of the themes in environment codes. The process of matching the individual with the environment should be based on both the person-environment congruence of the theme codes and on the congruence of the strength of the respective codes. Perhaps the congruence construct itself must be modified to include both a thematic matching and a weighted matching process. At the very least, a weighted means of determining the actual environmental code is recommended.

CHAPTER VIII

DISCUSSION OF THE RESULTS OF THE GENERAL SEARCH FOR RELATIONSHIPS

The specific nature of the findings, and implications of the findings that are specific to each of the three programs under study, are presented in Chapter V; this discussion will be limited to a summary of the major findings, and a synthesis of the generalized results.

The dominant conclusion to be drawn from a synthesis of all four of the research questions is that generalization across the three programs in the study is not possible. No predictor variable performed consistently across the three programs, in any of the forms of analysis.

Discussion of Question 3

Discussion of Correlational Results

Holland's (1985) theory describes six vocational personality types, and six corresponding work environments. Each of the six descriptors is based on a set of unique characteristics about the person or environment. The use of Holland's six basic personality types as predictors produced, as expected, differentiated results; no one theme was found to have significant relationships to either of the criteria (salary and days of employment) for each of the three programs. The realistic theme was significantly correlated to both salary and days of employment in the

Electronics and Accounting programs, but not to either in the Architecture program. The best predictor of salary for the Architecture students was the enterprising theme, which had no significant relationship to salary for Electronics students.

The variations noted in the patterns of correlation - (between the types and the criteria) for each of the three programs in the study serves to corroborate Holland's assumptions about the uniqueness of the types. The effects of a particular theme type on the criteria in this study depended upon the environment, and were not a product of the inherent nature of the type itself. However, the results were not always as anticipated; for example, although the artistic (A) theme was the dominant theme for the Architecture program, high artistic theme scores were negatively correlated with starting salary. For Accounting students, whose environmental code was CEI, the realistic theme was significantly correlated with salary. This yields a somewhat paradoxical condition: to fit the accounting environment, an individual should have a CEI personality, but higher salaries are associated with higher realistic scores.

Taken together, these results would suggest that certain aspects of the general theme types are universal (that is, they have an effect in a variety of environments), but that there appears to be an interaction with the

environment. The nature of that interaction requires further exploration.

The support constructs of differentiation, consistency, congruence, and identity also produced mixed results as predictors. Differentiation was a useful predictor of salary for Electronics students, and of days of employment for Accounting students. Consistency was negatively correlated to salary for Electronics students, but positively correlated to salary for Accounting students. Identity was positively correlated to both salary and days of employment for Accounting students, but unrelated to each criteria for both the Electronics and Architecture students. No significant results for either criteria in any program were found for congruence, and none of the support constructs produced significant results for Architecture students.

Once again, no clear pattern of support emerges for the use of Holland's constructs in the prediction of the criteria defined in this study. The efficacy of the support constructs appears to be linked to specific patterns of environment and/or personality. Further research exploring the linkages and interactions between the support constructs and specific theme types is needed.

Among the non-Holland predictors, previous full-time job experience (FT) was the most consistent across the three programs. Positive correlations between FT and salary were

found in all three programs, and between FT and days of employment in the Accounting and Architecture programs. Age was positively related to both criteria in the Accounting and Architecture programs, but to neither criterion in the Electronics program. Finally, a negative relationship was found between part-time job experience and salary for Electronics students; this pattern of negative relationship was evident in both of the other programs, although the correlations were not significant.

Discussion of Chi Square Analysis for Nominal Predictors

The nominal-level Holland predictors would not seem to be related to the nominal measures of job search success, except for the example of primary theme code with relation to training for AT students. Similarily, sex did not seem to be a factor in either job status or relation of employment to training. Second language students had differential job status as compared to their English as a primary language counterparts, primarily in the Architecture program.

Discussion of Chi Square Analysis for Interval-Level Predictors

No significant predictor-criteria relationships were observed across all three program groups. The relationships that were observed were confined to a single program, and to a single criterion within each program. Thus, the predictors identified are, at best, only marginally

predictive of the criteria of status and relationship to training. Furthermore, the relationships are differentially predictive; each program seems to have its own unique set of predictor-criteria relationships.

Discussion of ANOVA Results

As was the case for the other three methods of attempting to establish significant relationships between the predictor and criteria variables, the analysis of variance results could not be generalized across all three programs in the study. That is, none of the predictor variables had significant effects on the criteria variables for each of the three programs. However, some of the program-specific relationships that were found merit further discussion.

In the Electronics program, the secondary occupational theme code (THEM2) had a significant effect on starting salary, with the higher salaries going to individuals whose secondary theme code was artistic, and lower salaries to those whose code was conventional. This finding raises a fundamental question pertaining to the operationalization of Holland's theory: why did this result occur for the second theme code, and not the first? In earlier formulations of Holland's theory, only a single letter code was established to represent an individual's basic typology; this was later revised to incorporate secondary and tertiary aspects of vocational personality in the now-common three-letter code.

However, the primary code (i.e. the first theme in the code) is still seen to be the dominant theme. One would therefore assume that, in instances where personality type is likely to have an effect, the effect would be found in that first theme position, and not in the second as found in this study for the Electronics students.

The expected pattern of primary theme dominance was only found for the Architecture program, and even then, the highest salaries were found for students whose primary theme code was enterprising. The environmental code for Architecture was ARI. Thus, in both Architecture and Electronics, the highest salaries went to individuals whose primary or secondary code did not match any of the themes in the environmental code. If starting salary was strictly a function of personality type, one would expect higher salaries to go to those individuals who demonstrated enterprising characteristics; however, the fact that different themes received higher starting salaries in two different programs (and no significant differences in the third) suggests that it is the environment which is the key factor and not the general personality type. In other words, specific personality types within specific environments may have an effect on starting salary. Generalization of any given personality type across environments is not possible for the prediction of highest starting salaries.

The lowest salaries in both Electronics and Architecture went to individuals whose primary or secondary code was conventional; this finding supports Holland's description of the conventional personality. Once again, however, the results are environment specific; the Accounting program, with its high-conventional primary environmental theme, did not yield similar results.

Summary of Question 3 Discussion

The attempt to determine whether or not significant relationships existed beteen the predictor and criteria sets produced mixed results. Several relationships were found to be significant when the sample was considered to be a single group; however, these relationships were not repeated for each of the programs when they were considered independently. For example, the Artistic theme was found to have a significant negative correlation with salary for the whole group. However, a positive (though statistically insignificant) correlation was found between the Artistic theme and salary for each of the Electronics and Accounting programs. It would seem that the overall significant correlation noted for the whole group was due to the relatively strong negative correlation between the Artistic theme and salary for the Architecture students. In other words, strong correlations in one program tended to skew the

significance of the overall correlations obtained when the programs were treated as one group.

No pattern of predictor-criterion relationships emerged from any of the correlational, chi square, or analysis of variance procedures. It has therefore been concluded that the Holland themes and support constructs are differentially predictive of success in the job search process. That is, each program produced a unique pattern of predictor-criterion relationships. This conclusion, which parallels and is supported by the conclusions with respect to the environmental assessment described earlier, has significant implications for counsellors wishing to apply Holland's theory in their work.

A primary concern with respect to the differential predictability of the Holland variables is the need to carefully define specific target groups. If the relationships found for the whole group were generalized to specific programs, then serious errors could occur in the interpretation of an individual's scores. For example, based on the correlation between the Conventional theme and salary for the whole group ($r = -.014$), a counsellor may conclude that the Conventional theme has little bearing on an individual's potential earning power upon graduation. However, if the individual was considering the Electronics program, the Conventional theme does have a significant effect on salary; the higher the Conventional theme score,

the lower the starting salary ($r = -.389$). Thus, in order to do an effective job of interpreting the results of a Holland assessment to an individual, the differential effects of the various predictors for that specific program group must be known.

The strength of the relationships that did exist between predictor and criteria sets is also suspect; many of these relationships were statistically significant, but small enough to call to question their value in applied situations. Many of the correlations, for example, ranged in size from .15 to .25; correlations of this magnitude account for 2.25 to 6.25 per cent of the variance in the criteria. Counsellors seeking to apply such data would be well advised to consider such relationships as an indication of a potential trend, but not to place too much faith in the prediction.

Several additional results, not specific to the actual research questions, are worthy of a brief comment. The operationalization of the differentiation construct is not clear, based on the results of this study. In most of the comparison groups, the traditional method (subtracting the lowest theme score from the highest) of obtaining a measure of differentiation produced higher correlation coefficients than did the Monahan method (subtracting the second highest theme score from the highest). The original method would thus appear to be more suited to the prediction of salary

and days of employment than the Monahan method. However, the pattern was reversed for the prediction of relation to training using the chi square analysis. Furthermore, the correlation between the two methods of representing differentiation is only $r = .464$, $p < .001$, a value which accounts for only 21.5% of the shared variance. Thus, the two calculation methods either measure different constructs, or different facets of the differentiation construct. A more unified, refined means of assigning a differentiation value is needed.

Two significant sex differences were noted in the research. First, the average starting salary for females in the Architecture program was $218.00 per month lower than their male counterparts. There were no significant differences in either of the Electronics or Accounting programs. Thus, while there appears to be some measure of equality for the latter two programs, women in Architecture programs are still facing unequal opportunity.

The second sex difference noted occurred in the Accounting program: Females found employment sooner than did their male counterparts. During the six month span of the study, the women in the Accounting program were employed an average 30 days more than the men.

Students whose first language was other than English had a more difficult time making the transition to employment than did the students whose mother tongue was

English. Institutions may wish to explore the feasibility of job search seminars or support groups specifically for those students for whom English is a second language, in order to assist them to overcome the language barriers they face when attempting to find employment.

Discussion of the Results of Question 4

Attempts to increase the efficiency of the predictor set by combining variables into a prediction equation met with limited success. For the prediction of the number of days of employment an individual is likely to obtain after graduation, for the whole group, the most efficient Holland predictors were the investigative theme, differentiation, and identity. However, this combination of predictors only accounted for 6.42% of the variance in the criterion. Furthermore, this pattern was only repeated for the Accounting program; no improvements over single variable predictions were made for either of the Electronics or Architecture programs. The strength of the prediction from the Accounting program skewed the results for the sample as a whole.

The prediction of salary was even more varied by program than was the prediction of days of employment. Although a significant regression equation was obtained for the whole sample, it did not bear any resemblance to the equations derived from the three individual programs. Once again, it must be concluded that the Holland predictors are

differentially predictive, and the environment must be known before any predictions can be made.

Discussion of the Results of Question 5

Attempts to use the predictor set to classify individuals into categories of employment status and relation to training met with failure. Only one significant classification was obtained: in the Electronics program, the Holland predictors correctly classified 57.45% of the individuals into groups representing the relation of their employment to their training.

The theory of vocational personalities posited by Holland would lead one to conclude that the types and their support constructs would be useful for a priori assignment of individuals to the various categories of employment success. This was not the case for the programs in this study. A more detailed prediction set based on an interaction of theme types, support constructs and environment may improve the efficacy of such classification attempts.

General Conclusions Pertaining to the Search for Relationships

From the assessment of variable-criterion relationships, prediction equations, and classification attempts, three general conclusions may be drawn. First, there are no consistent relationships between the Holland predictors and the means of measuring job search success

defined in this study. However, the constructs were differentially predictive. This leads to the implication that the support constructs of differentiation, consistency, congruence, and identity have variable effects for different personality groups. In other words, the effect that a support construct such as differentiation has on one personality theme may not be the same as on another. For example, differentiation made a significant contribution to the regression equation for the prediction of days of employment for the Accounting program, but not for either of the Electronics or Architecture programs. The Accounting environment code was dominated by the conventional theme, whereas the Electronics and Architecture codes had, respectively, high realistic-investigative and artistic themes. Although such speculation requires further investigation, it may be that the differentiation construct is more of a factor for conventional personalities than for others in the prediction of days of employment.

The second conclusion, related to the first, is that any attempts to apply the Holland constructs must be done from within the context of a specific, well defined target group. The personality theme/support construct interactions need further clarification. There may be a point of diminishing returns, however; the utility of these constructs, when generalization is not possible, is severely hampered. Constructs such as differentiation and

consistency seem to have theoretical and practical utility, but the constraints on their application are such that detailed environmental information (or even detailed personal information) is required. The resulting reference tables or norm groups would have to be very comprehensive for any meaningful interpretations to be made to the individual.

The efficacy of an assessment instrument, such as the Self-Directed Search, in the prediction of job search success is limited. The wealth of personal and environmental data needed to make the predictions valid is enormous; without such detailed tables of reference, it would probably be easier for the counsellor to gain relevant information regarding the individual through an interview format.

The third general conclusion is that the evidence itself is rather weak; although the Holland constructs were able to account for significant proportions of variance in the respective criteria variables, the magnitude of the relationships is insufficient for confident predictions to be made. Within the context of specific programs, however, they are sufficient to indicate general trends, and could provide an interesting basis for discussion and exploratory work with clients.

CHAPTER IX

DISCUSSION OF THE RESULTS OF THE ANALYSIS OF HOLLAND'S PREDICTIONS

The analyses of Questions 6, 7, and 8 were conducted in order to answer three of Holland's specific predictions about the combination of constructs that would have the most bearing on unemployment and/or job change. Question 9, the final research question, provided a further test of the importance of the individual's primary theme code with respect to success in the job search, and as such, represented a final test of the utility of the Holland system in this area.

Discussion of the Results of Question 6

Holland (1985) proposed that incongruent individuals with higher consistency and differentiation scores would be better able to cope with unemployment or job change. To test this proposition, students with low congruence scores were placed into one of four categories of consistency-differentiation (i.e. low-low; low-high; high-low; high-high). No significant relationships were found in any of the subsequent analyses comparing the composite variable to the four measures of job search success. It was concluded that coping with job change or unemployment for incongruent individuals was not related to their levels of consistency and differentiation.

This finding raises further doubt about the utility of the support constructs of consistency and differentiation, especially used in combination. The theory intuitively makes sense; it would seem reasonable that individuals who are relatively committed to a single area of endeavor (i.e. highly differentiated) with secondary interests that are compatible to the primary area (i.e. highly consistent) would experience the greatest success in making the transition to work. However, there is a flaw in that line of reasoning; the primary theme in a highly differentiated individual takes on more significance than in less differentiated people. By extrapolation, the second and third themes must become less of a factor, and thus the consistency construct (which compares the primary theme to the other themes in the code) should not be as important in a highly differentiated person.

A further concern about the operationalization of the consistency-differentiation pairing is that the typical profile of the highly differentiated person has a clustering of secondary themes, whose scores are frequently within a few points of each other. If there is no significant difference between the secondary and tertiary themes in a person's code, then the concept of consistency loses its meaning. For example, consider the person whose tested code and actual scores was R(38) - I(17) - S(16). This person would be classified as differentiated and consistent.

However, if the I and S scores were reversed, the individual would be said to be inconsistent. The difference in the judgement was based on a one point difference in the scores, which is certainly within a margin of error. In the Manual for the Self-Directed Search, Holland (1986) recommends that, for the interpretation of af an individual's test results, scores within 8 points of each other be considered equally for the purposes of establishing a code for exploration activities; perhaps the consistency construct can only be operationalized when similar margins of error are used. Alternatively, the more detailed consistency measure proposed by Strahan (1987), which utilizes all three positions of the three-letter code, may alleviate this problem.

A final comment pertains to the use of the congruence construct as the basis for assessing the role of high consistency-high differentiation. There was a lack of significant correlations between congruence and the measures of job search success used in this study. Thus, the use of the congruence construct may not be appropriate in examinations of job search success; it does not appear to be a factor in the prediction of job search success. Assessing the effects of consistency/differentiation scores based on levels of congruence does not seem to be warranted.

Discussion of the Results of Question 7

Holland (1985) proposed that effective coping with unemployment and/or job change is positively associated with high consistency and identity scores. To test this proposition, the composite nominal variable (CI) was created, with four categories: low consistency/low identity; low consistency/high identity; high consistency/low identity; and high consistency/high identity. Chi square analyses were used to compare the composite consistency/identity variable to employment status and relation to training; analysis of variance procedures were used to compare the composite variable to days of employment and salary. No significant relationships were found. Therefore, it was concluded that coping with unemployment and/or job change is not associated with levels of consistency and identity.

By definition, high identity scores should be representative of a clearer sense of direction, and a degree of comfort with one's directions or goals; this would intuitively seem to play an important role in one's job search success. In addition, higher consistency scores should mean less ambiguity or role conflict in selecting acceptable employment. Together, these constructs would seem to be valid predictors of success in the job search process. However, as the results of this study would seem

to indicate, they have little or no bearing on how individuals cope with the job search. Once again, the problems associated with the operationalization of the consistency construct may be affecting the results. However, it appears that the job search process involves factors which are not related to degree of self-awareness/self-acceptance and cohesiveness of occupational interests.

Discussion of the Results of Question 8

Holland proposed a specific sequence of personality theme effectiveness in dealing with the unemployment and/or job change. However, the order of theme type coping efficiency varied from program to program, and did not follow Holland's predicted sequence. Furthermore, the sequence of coping efficiency varied from one criterion to another. The primary theme type thus played much less of a role in an individual's success in securing employment than Holland suggested.

Discussion of the Results of Question 9

A final test of the theory was provided in Question 9. Primary theme codes were examined to determine what effects, if any, the primary code had on the length of time it took for individuals to secure employment that was directly related to their training. Only those who obtained training-related employment were considered for the

analysis. Students were classified as having primary theme codes that were similar, moderatley similar, or dissimilar to the environmental code for the program they were in. No significant differences in the number of employment days were found between the three groups. It was concluded that the relationship of the primary theme code to the environmental code had no effect on the number of days of employment of the graduates.

This finding provides further support for the contention that the congruence construct in particular, and Holland's typology in general, is of limited value in the prediction of job search success. Furthermore, none of Holland's predictions with respect to coping with unemployment and/or job change were substantiated for the subjects in this study.

CHAPTER X

SUMMARY AND RECOMMENDATIONS FOR FURTHER RESEARCH

Theories of career development typically focus on the dynamics and/or processes of making occupational decisions, and of the subsequent effects of those decisions in the work place. A tacit assumption that these theories make is that once a decision has been made, opportunities to exercise that decision will be available. The present study was conducted in an attempt to make a link between Holland's (1985) theory of vocational personalities and success in the job search process.

The personality themes and supportive constructs described by Holland were found to be differentitally predictive; that is, different patterns of relationships were found to exist for each of the three programs studied, and for each of the methods of determining job search success. From this, it was concluded that specific information about the program environment is needed before any predictions could be made. Furthermore, generalizations about any of the support constructs or themes is not possible across the three programs.

The size of the relationships discovered was typically small. Thus, while they were statistically significant, they may have limited practical value. It was concluded

that the information obtained from an assessment of the Holland constructs could be used to provide an indication of potential trends, but that the confidence of the prediction is limited.

The environmental assessment for each of the programs in the study produced a different occupational code than was predicted in the Occupations Finder for the Self-Directed Search (Holland, 1986). The study concluded that environmental ass ssments are essential for any application of the Self-Directed Search, or similar instruments. Furthermore, a weighting system for deriving an occupational code similar to that used in this study was recommended.

A final general conclusion about the applicability of structural approaches to this kind of study is in order. The complexity of the relationships among the data, and the variations noted between the predictor sets and criterion sets suggests a diminished efficacy of a structural approach. The Holland system in particular, and structural approaches in general, may be less effective than process approaches in determining the salient dynamics of the job search process for each individual.

In summary, Holland's general model, as currently operationalized, had little relevance for the prediction of job search success for the participants in this study. Although improvements to the operationalization of the basic support constructs may improve the theory's efficacy in this

area, it is more likely that a combination of structural and process approaches is required. For example, considering the individual's work salience, as proposed by Super (1985) and/or the need structure (Hoppock, 1976) underlying the individual's motivation to find employment in addition to structural dynamics may prove more fruitful. On its own, the Holland model does not provide sufficient relevant information to warrant its application for the understanding of the job search dynamic, and as such, is limited in its utility as a well rounded theory of career choice and development.

A final point of discussion worthy of noting concerns the utility of the Self-Directed Search for personal exploration. This study has demonstrated that information about an individual's personality themes and proposed occupational codes can give an indication about the individual's likelihood of succeeding in the job search. However, the relationships between the theme types and support constructs is not a straightforward one; they are theme and environment interdependent. Furthermore, accurate information is needed about the actual environmental themes that are represented in occupations. The complexity of the relationships, and the scarcity of accurate data, place severe limitations on the instrument as a tool for "self-direction". The results of the SDS need knowledgable interpretation from a trained counsellor in order to be

effective. The latter conclusion applies equally to the prediction of job search success and to the application of the instrument for more traditional purposes such as career decision-making.

Recommendations for Further Research

The data from this study will provide an ample basis for further clarification of the interpretation and operationalization of Holland's typology. Although the Holland constructs were not effective in the prediction of employment success in this study, it is not clear whether that was due to faulty theory or inappropriate operationalization of the theory. Thus, there appears to be a need to examine how the constructs are operationalized, and determine whether or not other methods of operationalization would clarify the constructs. This need would particularly seem to apply to the constructs of differentiation and consistency. The following studies are recommended as a direct follow-up to this study:

1. A direct comparison of the traditional method of determining differentiation with the one described by Monahan (1987) needs to be conducted. It is further recommended that a composite differentiation measure that accounts for the relative positions of all of the themes in one's profile be developed. It may also be necessary to take into account the overall height of the profile.

2. A similar comparison of the traditional method of measuring consistency with the Strahan (1987) method is recommended.

A major conclusion of the study pertained to the need for accurate environmental data in order to utilize a structural approach. A modified environmental assessment technique was developed for this study; however, further environmental assessments using a weighting system need to be done. These assessments will provide additional occupational information for counsellors and clients, and help to refine the assessment technique.

The conclusions drawn from this study call to question the value of structural approaches in general, and Holland's typology in particular, in the prediction of employment success. It would be useful, however, to examine the interactions between the theme types and the support constructs in greater detail. If, as this study suggests, the constructs (eg., differentiation, consistency, congruence, and identity) affect theme types differently, the nature and degree of those effects need to be clarified. Furthermore, a replication study using different sub-groups is suggested as a means of generalizing the findings of this study. Two-year college programs emphasizing Social and Enterprising personalities would be especially relevant, to provide balance to the results of this study.

Finally, a comparison of the efficacy of structural versus process theory in describing the job search process could be made by replicating this study using concepts from Super's (1957; 1985) theory. For example, the relative effects of work salience and values could be examined. Such a study may be useful for clarifying appropriate approaches to the study of career development.

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APPENDIX A

Table 1: Reliability and Validity Tables for the Self-Directed Search

Table 2: Reliability and Validity Tables for My Vocational Situation

Table 1: Reliability and Validity Tables for the Self-Directed Search

Table 19
Internal Consistency Coefficients for Activities, Competencies, and Occupational Scales

	Men (*N*=358)			Women (*N*=366)		
	X	SD	KR20	X	SD	KR20
ACTIVITIES						
Realistic	4.46	3.28	.84	1.32	1.94	.77
Investigative	5.60	2.96	.77	4.27	2.65	.75
Artistic	4.61	2.76	.73	6.94	2.39	.70
Social	6.56	2.25	.63	8.50	1.81	.53
Enterprising	6.23	2.90	.78	6.20	2.74	.75
Conventional	3.60	2.78	.79	3.73	2.73	.79
COMPETENCIES						
Realistic	5.30	3.30	.83	1.14	1.72	.75
Investigative	7.77	2.43	.72	6.20	2.50	.68
Artistic	2.67	2.27	.71	4.60	2.59	.69
Social	6.43	2.48	.71	8.09	2.17	.65
Enterprising	4.59	2.77	.75	4.72	2.75	.75
Conventional	2.77	2.17	.69	3.15	2.34	.72
OCCUPATIONS						
Realistic	3.12	2.77	.77	1.19	1.77	.75
Investigative	5.07	3.90	.86	3.77	3.38	.84
Artistic	3.48	3.62	.87	5.77	3.93	.85
Social	3.61	3.43	.84	6.36	3.67	.82
Enterprising	4.01	3.42	.83	2.43	2.63	.78
Conventional	2.43	3.25	.88	1.48	2.32	.82

Source: Gottfredson and Holland (1975b)

Table 20
Retest Reliability Coefficients of SDS Summary Scales and Codes

Summary Scale	High-School Students		College Freshmen
	Boys (*N*=118)	Girls (*N*=57)	(*N*=65)
Realistic	.81	.62	.60
Investigative	.87	.66	.84
Artistic	.49	.78	.83
Social	.68	.44	.74
Enterprising	.54	.57	.70
Conventional	.31	.72	.76
Median	.61	.64	.75
Rank Order (rho) of Summary Codes (median)	.81	.83	.92
Time interval	3-4 weeks		7-10 months

Based on unpublished data from Zener and Schnuelle and data from O'Connell and Sedlacek (1972)

Table 21
Means, Standard Deviations, and Correlations for Summary Scores: One-year Interval between Pretest and Posttest

	Correlation Pretest vs Posttest		Pretest				Posttest			
	Female (*N*=52)	Male (*N*=27)	Female (*N*=52)		Male (*N*=27)		Female (*N*=52)		Male (*N*=27)	
Scale			M	SD	M	SD	M	SD	M	SD
Real	.77	.81	2.3	2.4	5.2	4.0	2.0	2.1	5.3	3.5
Inv	.86	.91	6.3	4.5	8.0	5.6	6.5	5.0	7.8	5.1
Art	.89	.95	6.7	4.0	4.1	4.3	6.1	4.4	4.1	4.2
Soc	.59	.86	10.9	3.0	9.7	3.9	10.5	3.1	9.1	4.0
Ent	.70	.63	3.2	3.0	4.4	2.8	3.6	3.3	3.7	2.9
Conv	.66	.90	3.4	3.6	2.1	3.4	3.3	4.2	2.2	3.6

Note: The sample described above is an Australian sample of teachers tested in training and on the first teaching job; the data was obtained by Paul Power (1979), who used the 1970 edition of the SDS.

Table 2: Reliability and Validity Tables for My Vocational Situation

Scale	Males K-R 20	*M*	*SD*	*n*	Females K-R 20	*M*	*SD*	*n*
High school students								
Vocational Identity	.86	11.20	5.46	185	.86	11.27	5.39	311
Occupational Information	.39	3.65	1.17	185	.44	3.67	1.10	311
Barriers	.23	2.03	1.21	185	.23	1.82	1.13	311
College students and workers								
Vocational Identity	.89	16.54	5.32	291	.88	14.86	5.36	301
Occupational Information	.79	2.63	1.43	289	.77	2.01	1.47	300
Barriers	.45	3.35	.86	288	.65	3.16	1.06	300

Note. The *n*s are less than the number of people surveyed due to incompletely filled out questionnaires.

Table 4

Intercorrelations Among My Vocational Situation (MVS) Scales, Ratings, Occupational Alternatives, and Age

Item	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Age	—	−.19**	−.15*	.06	.15**	−.01	−.12	−.11	−.03	.23*	−.0
n		255	255	300	299	299	115	115	115	89	116
MVS scale											
2. Number of Occup.[a]	−.26**	—	.67**	−.13*	−.21**	−.04	−.11	.07	−.12	−.02	−.2
n	229		256	256	255	255	110	110	110	85	111
3. Variety of Occup.[b]	−.22**	.59**	—	−.16**	−.18**	−.11	−.28**	.23*	−.12	.06	−.2
n	229	231		256	255	255	110	110	110	85	111
4. Vocational Identity	.28**	−.16*	−.23**	—	.51**	.43**	.26**	−.25**	.28**	−.11	.3
n	287	231	231		300	300	115	115	115	89	116
5. Occupational Information	.32**	−.25**	−.17**	.60**	—	.38**	.14	−.20*	−.03	−.05	.1
n	285	229	229	289		300	115	115	115	89	116
6. Barriers	.19**	−.09	−.13*	.55**	.39**	—	.11	−.13	.01	.03	.0
n	284	230	230	288	287		115	115	115	89	116
Rating category											
7. "Well organized"	.24*	−.03	−.17	.50**	.39**	.36**	—	−.81**	.51**	−.27**	.4
n	90	87	87	90	88	89		115	115	89	115
8. "At loose ends"	−.16	−.11	.09	−.41**	−.33**	−.31**	−.75**	—	−.45**	.21*	−.4
n	90	87	87	90	88	89	90		115	89	115
9. "Self-confident"	−.06	.20	.08	.31**	.31**	.25*	.54**	−.51**	—	−.52**	.4
n	90	87	87	90	88	89	90	90		89	115
10. "Tense and uncomfortable"	.12	−.23*	−.08	−.04	−.14	−.15	−.30**	.51**	−.49**	—	−.3
n	72	70	70	72	70	71	72	72	72		89
1. "Competent to handle life well"	−.05	.07	−.06	.42**	.29**	.37**	.63**	−.48**	.56**	−.41**	—
n	90	87	87	90	88	89	90	90	90	72	

Note. Correlations for females are above the diagonal; those for males are below the diagonal.

[a] The number of occupations or alternatives a person is considering.

[b] The variety of occupations or alternatives a person is considering, or the number of different occupational categories according to Holland's classificatic so that scores can range from 1 to 6 (Holland, 1973).

* $p < .05$. ** $p < .01$.

APPENDIX B

Table 1: The Iachan and Zener-Schnuell Indices of Agreement

Table 2: Strahan's Measure of Consistency

Table 3: Environmental Weighting System

Table 4: Alternative Environmental Codes

Table 1: The Iachan and Zener-Schnuelle Indices of Agreement

Zener-Schnuelle Index of Agreement

Method for determining degree of agreement	Index of Agreement
Are codes exactly alike?	6
Are the first two letters in the same order?	5
Are the letters the same, but out of order?	4
Does the first letter in each code match?	3
Do the first two letters of one code match any two letters in the other code?	2
Does the first letter of either code match any letter in the other code?	1
Is the first letter from one code not found in the second code?	0

(Adapted from The Self-Directed Search Manual, by John Holland, 1979. Consulting Psychologists Press, Inc., Palo Alto, California.)

Iachan Index of Agreement

Weights Used to Assess Agreement Between Two Three-Letter Codes

Individual's Vocational Code Environment Code	First Letter	Second Letter	Third Letter
First Letter	22	10	4
Second Letter	10	5	2
Third Letter	4	2	1

(Adapted from Ronaldo Iachan (1984) "A Measure of Agreement for Use with the Holland Classification System", in Journal of Vocational Behavior, 24, 133-141.

Example Calculations

Environmental Code	Personal Code	Z-S Score	Iachan Score
R-I-E	E-I-R	4	4 + 5 + 4 = 13
R-I-E	R-E-I	4	22 + 2 + 2 = 26
R-I-E	R-A-S	3	22 + 0 + 0 = 22
R-I-E	I-P-C	1	10 + 10 + 0 = 20

Table 2: Strahan's Measure of Consistency

Three-letter Codes						CONSISTENCY
RIA	IAS	ASE	SEC	ECR	CRI	9
RIS	IAE	ASC	SER	ECI	CRA	7
RIE	IAC	ASR	SEI	ECA	CRS	8
RIC	IAR	ASI	SEA	ECS	CRE	10
RAS	ISE	AEC	SCR	ERI	CIA	3
RAE	ISC	AER	SCI	ERA	CIS	4
RAC	ISR	AEI	SCA	ERS	CIE	5
RAI	ISA	AES	SCE	ERC	CIR	6
RSE	IEC	ACR	SRI	EIA	CAS	1
RSC	IER	ACI	SRA	EIS	CAE	2
RSI	IEA	ACS	SRE	EIC	CAR	2
RSA	IES	ACE	SRC	EIR	CAI	1
REC	ICR	ARI	SIA	EAS	CSE	6
REI	ICA	ARS	SIE	EAC	SCR	5
REA	ICS	ARE	SIC	EAR	CSI	4
RES	ICE	ARC	SIR	EAI	CSA	3
RCI	IRA	AIS	SAE	ESC	CER	10
RCA	IRS	AIE	SAC	ESR	CEI	8
RCS	IRE	AIC	SAR	ESI	CEA	7
RCE	IRC	AIR	SAI	ESA	CES	9

(Adapted from R. Strahan (1987) "Measures of Consistency for Holland-Type Codes", in Journal of Vocational Behavior, 31 37-44.

Examples

Code	Traditional Consistency Score	Strahan Consistency Score
C-E-A	3	7
C-E-R	3	10
S-I-R	2	3
S-I-A	2	6
A-C-S	1	2
A-C-E	1	1

Table 3: Environmental Weighting System

The frequency (f) of the occurrence of each of the six themes (RIASEC) was assigned a specific weight (w), according to the position of the theme in the three-position code. The weights that were assigned were 3, 2 and 1, for the first, second, and third positions, respectively. A weighted frequency (wf) was then calculated as the product of the frequency and the corrsponding weight. The weighted total was then calculated, as follows:

TOTAL = f(THEM1) X 3 + f(THEM2) X 2 + f(THEM3) X 1

or, alternatively as

TOTAL = wf

This procedure was repeated for each of the six themes; the totals were then placed in descending rank order; the environmental code was defined by the themes with the three highest TOTALs.

Example: Electronics Program

From Table 6, the Realistic theme occurred in the primary theme position (THEM1) 55 times, 35 times in the second (THEM2) position, and 12 times in the third (THEM3). Thus, the Realistic total was

TOTAL = f(THEM1) X 3 + f(THEM2) X 2 + f(THEM3) X 1
= 55 X 3 + 35 X 2 + 12 X 1
= 165 + 70 + 12
= 247

The weighted TOTALs for the other 5 themes (from Table 6) were I (227); A (18); S (60); E (75); and C (33).

The themes, placed in descending rank order, were

R-I-E-S-C-A

and thus, the summary environmental code was expressed as

R-I-E

for the Electronics program.

Table 4: Alternative Environmental Codes

Program	Weighted Frequencies	Means	Medians	Modes
Electronics	R-I-E	R-I-E	R-I-E	I-E-R
Accounting	C-E-I	C-E-S	C-E-I	C-E-I
Architecure	A-R-I	A-R-I	A-R-I	S-I-E

APPENDIX C

NAIT Graduate Placement Survey and Registration Form

Ethics Release Form (Department of Educational Psychology)

Memorandum : Approval of Research by an Outside Researcher at NAIT

NAIT GRADUATE PLACEMENT SURVEY AND REGISTRATION FORM

This information is used by the Institute for program planning, reviewing service levels and as a guide to potential students considering a program.

-PERSONAL INFORMATION-

PLEASE PRINT:

DATE OF GRADUATION:_____

NAIT PROGRAM:_____ 2nd YEAR OPTION: _____ STUDENT I.D._____

SURNAME:_____ FIRST NAME: _____ SECOND NAME:_____

TELEPHONE NUMBER: (FOR MESSAGES OR DAY CONTACT ONLY): _____ _____ _____
(Area Code) Name of Contact Person

_____ _____ _____
(Area Code) Name of Contact Person

ADDRESS: (After Graduation)_____
(Street) (City) (Province) (Postal Code)

(Section I) EMPLOYMENT INFORMATION

1. A. HAVE YOU ACCEPTED A FULL-TIME POSITION LASTING MORE THAN 4 MONTHS? __YES (Complete 2-5 & 16) __NO
   B. ACTIVELY SEEKING PERMANENT EMPLOYMENT? __YES (Complete 6-16) __NO
   C. PLANNING TO UNDERTAKE FURTHER FULL-TIME STUDY WITHIN 5 MONTHS? __YES __NO
   D. OTHER (Please Explain)_____

-PLACEMENT INFORMATION-

2. NAME AND ADDRESS OF YOUR EMPLOYER:
   NAME:_____ START DATE: _____
   ADDRESS: (Street Address)_____
   _____ POSTAL CODE:_____
   (Town or City) (Province/Country)
   TELEPHONE NO.:_____
   WHAT IS YOUR STARTING SALARY? Monthly $_____ Weekly $_____ Wages $_____ Commission _____
3. IS YOUR POSITION: __FULL TIME __SUMMER __TEMPORARY (Answer One Only)
4. IS THE POSITION RELATED TO THE TRAINING YOU RECEIVED AT NAIT? __ Directly __ Indirectly __ No
5. HOW DID YOU OBTAIN YOUR POSITION? THROUGH ...
   __ PLACEMENT CENTRE __ NEWSPAPER AD __ OTHER (Explain)_____

(Section II) -REGISTRATION - PLACEMENT CENTRE-

6. PREVIOUS WORK EXPERIENCE (Relating to NAIT Program): _____years _____months
7. DATE AVAILABLE FOR EMPLOYMENT: _____(MM/DD)
8. OTHER CERTIFICATES OR DIPLOMAS HELD: (Journeyman Certificate, Degrees, etc.)_____
9. WILLING TO RELOCATE: __ WITHIN ALBERTA __ OUTSIDE ALBERTA __ NO
10. WILL YOU CONSIDER A SALES RELATED POSITION? __ YES __ NO
11. TYPING SPEED: _____W.P.M.
12. MINIMUM ACCEPTABLE STARTING SALARY: _____/MONTH
13. WILL YOU ACCEPT A POSITION ON A COMMISSION ONLY BASIS? __YES __NO
14. COMPANIES WHOSE POSITIONS YOU WOULD NOT CONSIDER AT THIS TIME:
    _____
    _____
    _____
15. COMMENTS (If any)_____
    _____
16. I HEREBY GRANT NAIT PERMISSION TO USE THE ABOVE INFORMATION FOR PLACEMENT AND STATISTICAL PURPOSES.

_____ _____
(Date) (Signature)

THANK YOU FOR YOUR CO-OPERATION IN COMPLETING AND RETURNING THE QUESTIONNAIRE TO THE PLACEMENT CENTRE, 11762-106 STREET, EDMONTON T5G 2R1

/62p

RESEARCH PROPOSAL: Dept. of Educational Psychology

1. **Organization(s) to be Involved**

   (a) Northern Alberta Institute of Technology

   (b) _____

   (c) _____

2. **Requestor** (Academic Staff Member)

   Name _____

   Request made on behalf of self/student student

   If the latter, student's name Kris C. Magnusson

   address 1806 111 35 83 Ave (T6G 2G6-145C)

   phone 439 2774

   degree for which s/he is working M.Ed./Ph.D. Ph.D

   The research will be for M.Ed. thesis/Ph.D. thesis/course no. C&C

3. **Description of Research:**

   (a) title: A Study of the Relationship Between Holland's Theories of Vocational Choice and the Prediction of Success for Job Seekers

   (b) instruments to be used (enclose a copy, if possible)

   Self-Directed Search
   My Vocational Situation

   (c) approximate number of subjects 500

   (d) age range of subjects 18-25 (average)

   (e) how you plan to ensure confidentiality and anonymity?

   Data coded by student id number (from NAIT), results reported in groups data, with no linking to individuals in the study

(f) do the research procedures have potential to produce mental harm to the subjects? Yes/No No

(g) will the subjects be free to opt-out partly or wholly at any stage? Yes/No Yes

(h) will they be approached to give voluntarily consent to participate? Yes/No Yes

4. Declaration of the requestor: (Academic staff member) I have gone through the above and I feel confident that the proposed research does not violate the "Ethical Guidelines for Human Research: circulated by the U. of A., in December, 1984.

Signature: [signature]

Date: Feb 27/87

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Recommendation of the Area Representative

(✓) Approved
( ) Recommend minor changes
( ) Have serious reservations about the proposal

Signature: [signature]

Date: March 2/87

Decision of the Committee

On behalf of the Research Committee of the Department of Educational Psychology, the above proposal is approved with respect to ethical matters.

Ram K Gupta
Chairman

Mar 2/87
Date

NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY

MEMORANDUM

To: F. Williamson, Vice President Instruction

Date: February 4/87

File No:

From: L. Morgan, Director Program Development Services

Phone: 471-7006

Subject: Approval of Research by an Outside Researcher at NAIT

Kris and I read K. Magnusson's research proposal, which is entitled Relationship Between Vocational Choice and Prediction of Job Seeking Success.

Methodology

Two self-scoring questionnaire instruments will be administered to a sample of 75 students, 2 months prior to graduation, from each of three 2-year program areas. Six months after graduation, a follow-up questionnaire will be sent out to determine their relative success in their individual job search.
The time commitment on the part of the 225 students in total will amount to one class period each.

Cost to NAIT

It is our condition of approval that there will be no incremental cost to NAIT.

Benefit to NAIT

There could be implications for Counselling. - i.e. positive implications / benefits.

I recommend approval.

L. Morgan, Director
Program Development Services

Agree: F. Williamson
5 Feb 87